

Water and water shortage in Iran
Case study Tashk-Bakhtegan and Maharlu lakes basin, Fars Province,
South Iran

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Abstract

Tashk-Bakhtegan and Maharlu lakes' basin in Fars province in south of Iran is facing a harsh water shortage in recent years. In the thiis study for the first time a complete research was carried out to understand the hydrologic circle of Tashk-Bakhtegan and Maharlu lakes' basin. In this study those basins were evaluated in terms of meteorology, surface water, groundwater, water quality, and water balance was carried out. Although the agriculture section was evaluated as the most water consumer. In the appendix part are presented tables and figures of study in different part of study.

Zusammenfassung

Das Taschk-Bakhtegan- und Maharlu-Seenbecken, welches in der Fars-Provinz im Süden des Irans gelegen ist, erleidet seit einigen Jahren eine extreme Wasserknappheit. Die vorliegende Studie führt eine erstmalige Untersuchung zum besseren Verständnisses der Wasserkreisläufe des Taschk-Bakhtegan und Maharlu Seenbeckens durch. Hierbei wurde das Becken hinsichtlich Meteorologie, Oberflächenwasser, Grundwasser, Wasserqualität und Wasserhaushalt bewertet. Obwohl sich die Landwirtschaft als Hauptwasserverbraucher resultierte. Im Anhang Teil sind Tabellen und Zahlen des Studiums in verschiedenen Teil der Studie vorgestellt.

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Table1: Study areas information

Column	Studies area	Code	U.T.M		Area (km ²)	Main river
			Western limit Eastern limit	Southern limit Northern limit		
1	Tavabee Arsanjan	4301	700 735	3280 3305	275	Seasonal Arsanjan river
2	Arsanjan	4302	705 765	3395 3225	879	Seasonal Arsanjan river
3	Seydan-Farough	4303	685 715	3300 3325	369	-
4	South Tashk lake	4304	735 770	3275 3290	163	-
5	Abadetashk-Jahanat	4305	725 230	3370 3310	1937	-
6	Khanekat	4306	730 765	3245 3265	383	-
7	Kheir	4307	765 215	3235 3250	229	Seasonal Estahban river
8	Estahban	4308	775 230	3220 3235	417	Seasonal Estahban river
9	Neyriz	4309	215 260	3220 3260	1019	-
10	Tangehana-Pichakar	4310	735 235	3235 3290	2080	-
11	Marvdasht-Kherameh	4311	625 740	3245 3370	3941	Kor & Sivand riveres
12	Darian	4312	660 695	3265 3285	334	-
13	Saadatabad	4313	670 710	3310 3350	723	Sivand
14	Sarpaniran	4314	710 745	3315 3335	446	-
15	Gaderabad-Madarso	4315	670 760	3320 3390	2908	Galedar & Sivand rivers
16	Dehbid	4316	660 730	3360 3410	1890	Dehbid & Kalmeshkan river
17	Namdan	4317	590 680	3370 3460	2803	Shadkam river
18	Beiza-Zarghan	4318	600 675	3285 3340	1738	-
19	Dozhord-Kamphirouz	4319	570 640	3335 3410	2094	Kor & Shor-Shirin riveres
20	Khasoro Shirin	4320	575 615	3390 3430	625	Sefid river
21	Asopas	4321	600 680	3350 3410	1623	Ablangan river
22	Bakan	4322	610 640	3360 3385	334	-
23	Shiraz	4323	615 675	3265 3320	1428	Khashkerud & Chenarrahdar riveres
24	Ghsrebagh	4324	635 675	3240 3275	435	Babahaji Seasonal river
25	Kavar Maharlu	4325	655 675	3230 3255	323	-
26	Srvestan	4326	670 735	3210 3240	1641	Nazarabad Seasonal river
27	Goshnegan	4327	670 695	3240 3270	427	-

Table 2: Temperature parameters

Sep.	Ang.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Statistical characteristic	Statistical duration	Station
40.0	44.4	40.0	40.0	36.6	31.1	25.0	20.0	21.0	27.0	33.0	38.8	Max- Absolut	34	Bajgah
31.2	33.6	34.0	30.7	24.4	18.8	14.2	10.4	10.0	13.7	19.8	26.4	Max- Average		
20.2	23.5	23.6	20.0	15.5	11.0	6.9	3.4	3.0	5.6	9.7	15.3	Average		
9.1	13.4	13.1	9.3	6.5	3.1	-0.4	-3.6	-4.1	-2.6	-0.5	4.1	Min- Average		
-5.0	4.4	5.5	-1.0	-5.5	-7.7	-12.7	-19.0	-25.6	-14.4	-12.2	-7.7	Min- Absolut		
32.0	35.0	34.0	30.0	16.0	19.0	12.0	8.5	7.5	13.0	19.0	28.8	Max- Absolut	19	Tange boragh
32.1	34.3	34.1	30.3	22.5	17.9	12.8	7.9	7.9	17.0	18.9	27.2	Max- Average		
23.7	26.7	26.4	22.5	16.1	11.8	7.2	2.9	3.1	9.3	12.3	18.9	Average		
15.3	19.1	18.7	14.6	9.8	5.7	1.5	-2.1	-1.8	1.7	5.7	10.7	Min- Average		
5.0	12.0	9.0	6.0	-2.0	-4.0	-13.5	-18.0	-16.0	-10.0	-1.0	4.0	Min- Absolut		
40.0	43.0	43.0	40.5	38.0	33.4	28.0	25.0	23.0	29.0	36.0	37.0	Max- Absolut	30	Jahanabd Bakhtegan
35.2	37.6	38.1	34.9	28.3	21.7	17.4	13.5	12.8	16.2	22.9	29.6	Max- Average		
25.9	29.1	29.2	25.4	20.1	14.7	10.6	7.0	6.2	8.8	14.2	20.2	Average		
16.6	20.5	20.4	16.0	12.0	7.7	3.8	0.5	-0.5	1.4	5.5	10.8	Min- Average		
7.0	11.0	10.0	9.0	4.5	-2.1	-6.5	-8.0	-7.5	-7.5	-4.5	0.5	Min- Absolut		
38.0	39.0	39.0	38.0	28.0	23.0	21.0	11.0	17.0	17.0	26.5	33.0	Max- Absolut	13	Ghambaria n
30.1	32.8	32.5	26.1	16.3	12.4	8.3	5.9	6.3	8.6	13.9	21.3	Max- Average		
19.3	21.9	21.9	17.7	10.7	7.9	4.0	0.9	0.8	3.6	6.9	12.8	Average		
8.5	11.1	11.3	9.3	5.2	3.3	-0.3	-4.1	-4.7	-1.3	-0.1	4.3	Min- Average		
3.0	5.0	5.0	3.5	-3.0	-4.5	-11.0	-25.0	-20.0	-13.0	-8.0	-3.0	Min- Absolut		
39.5	40.0	40.5	38.5	36.0	29.0	28.0	24.0	23.0	26.0	29.0	37.0	Max- Absolut	39	Chamriz
32.0	34.3	34.2	30.7	24.3	18.7	14.1	9.4	9.7	13.8	20.2	27.2	Max- Average		
22.3	25.1	24.5	21.3	16.3	11.7	7.5	3.4	3.6	6.9	11.9	17.5	Average		
12.6	15.9	14.8	11.9	8.3	4.6	0.9	-2.6	-2.5	0.1	3.5	7.8	Min- Average		

Sep.	Ang.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Statistical characteristic	Statistical duration	Station
39.6	41.5	42.5	39.5	38.0	30.5	26.0	22.0	22.5	23.0	31.5	35.3	Max- Absolut	35	Dobaneh
34.3	36.9	37.0	33.6	27.9	21.4	16.2	12.6	11.8	15.3	21.8	28.2	Max- Average		
27.3	30.4	30.3	27.1	21.7	15.6	11.0	7.5	6.9	9.5	15.0	21.4	Average		
20.3	24.0	23.5	20.6	15.5	9.8	5.8	2.4	2.0	3.6	8.1	14.6	Min- Average		
10.5	18.0	10.5	11.0	6.0	-1.5	-2.0	-6.5	-10.0	-4.0	-1.5	1.0	Min- Absolut		
35.0	37.0	39.0	37.5	37.5	27.0	25.5	23.0	19.5	25.0	27.0	38.0	Max- Absolut	17	Debid
26.8	30.6	33.0	30.5	23.5	18.3	14.3	9.9	8.0	11.7	16.2	21.8	Max- Average		
17.2	21.2	23.3	21.0	15.4	10.6	6.9	2.4	0.1	2.7	7.4	13.1	Average		
7.7	11.9	13.6	11.4	7.4	3.5	-0.6	-5.0	-7.9	-6.4	-1.5	4.4	Min- Average		
2.0	5.0	7.0	1.0	1.0	-10.0	-10.5	-19.5	-22.0	-18.0	-13.0	-2.0	Min- Absolut		
39.4	41.6	42.2	40.0	36.2	30.6	26.5	22.5	21.0	23.0	27.5	35.5	Max- Absolut	25	Zarghan
33.5	36.8	37.4	34.8	28.7	22.3	17.2	13.3	10.7	13.7	20.1	27.8	Max- Average		
23.1	27.0	27.5	24.3	19.4	14.3	9.8	6.3	4.5	6.9	11.4	17.7	Average		
12.8	17.2	17.6	13.8	10.2	6.2	2.4	-0.7	-1.6	0.1	2.7	7.6	Min- Average		
5.4	9.5	8.0	4.0	0.5	-4.0	-8.0	-10.0	-13.6	-9.5	-6.0	-3.5	Min- Absolut		
37.9	40.4	41.0	39.0	35.4	30.0	25.8	23.0	20.4	23.0	26.5	38.0	Max- Absolut	39	Drodzan dam
31.9	35.5	36.3	33.8	28.1	22.1	16.9	12.1	9.3	12.5	18.4	26.2	Max- Average		
24.3	27.8	28.6	25.9	20.9	15.5	10.4	6.2	4.1	7.0	12.1	18.7	Average		
16.6	20.1	21.0	18.1	13.6	8.9	4.2	0.4	-1.1	1.4	5.7	11.1	Min- Average		
7.4	10.0	10.0	7.0	4.0	-1.0	-6.0	-14.0	-13.0	-8.5	-8.5	3.5	Min- Absolut		
36.0	37.0	38.0	36.0	32.0	27.0	25.0	19.0	19.0	25.0	29.0	35.0	Max- Absolut	20	Sadeh
30.4	32.6	32.3	28.6	22.2	15.9	10.7	6.6	7.9	11.5	18.4	24.9	Max- Average		
21.7	24.8	24.3	20.4	15.2	9.4	4.9	0.5	1.6	5.2	10.6	16.2	Average		
12.9	17.1	16.3	12.3	8.2	3.0	-1.0	-5.6	-4.8	-1.1	2.6	7.5	Min- Average		
5.0	10.0	2.0	4.0	-1.0	-10.0	-11.0	-23.0	-25.0	-16.0	-7.0	-1.0	Min- Absolut		

Sep.	Ang.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Statistical characteristic	Statistical duration	Station
39.0	42.0	43.2	42.0	38.2	34.0	28.5	24.0	22.4	23.2	28.0	34.4	Max- Absolut	56	Shiraz
33.7	37.0	37.8	36.0	30.6	24.1	18.7	15.0	21.1	14.5	20.4	27.9	Max- Average		
24.4	28.3	29.2	26.8	22.2	16.6	11.9	8.4	6.2	7.9	12.5	18.8	Average		
15.1	19.5	20.6	17.7	13.7	9.0	5.0	1.8	0.2	1.4	4.5	9.7	Min- Average		
4.0	11.0	14.0	9.0	1.0	-2.0	-4.0	-8.0	-14.0	-11.0	-8.0	1.6	Min- Absolut		
41.0	44.0	45.0	41.0	39.0	33.0	27.0	30.5	26.0	26.0	35.0	39.0	Max- Absolut	38	Abbas abad
32.7	35.9	36.0	32.8	26.3	19.9	15.0	10.4	10.4	14.1	20.9	28.2	Max- Average		
22.7	26.2	26.4	23.1	17.8	12.4	7.9	4.1	3.8	6.8	12.4	18.8	Average		
12.8	16.5	16.8	13.4	9.3	4.9	0.8	-2.2	-2.8	-0.5	3.9	9.5	Min- Average		
4.0	8.0	8.0	5.0	-4.5	-7.0	-12.0	-22.0	-15.0	-10.0	-5.0	0.0	Min- Absolut		
39.0	41.5	41.0	39.5	35.5	29.8	25.0	20.2	19.5	26.5	26.5	32.0	Max- Absolut	35	Aliabad Kamin
32.0	35.4	36.2	34.3	28.4	22.3	16.4	12.7	10.3	13.0	19.1	25.9	Max- Average		
21.5	25.3	26.4	23.8	19.0	14.3	9.2	5.9	3.8	6.1	10.4	16.1	Average		
11.1	15.2	16.7	13.3	9.7	6.3	2.0	-0.9	-2.8	-0.9	1.8	6.3	Min- Average		
-5.0	-0.5	9.5	0.0	0.0	-2.0	-10.0	-11.5	-13.5	-12.5	-9.0	-5.0	Min- Absolut		
37.0	38.0	39.0	37.0	33.0	27.0	23.0	18.5	21.0	23.0	28.0	32.0	Max- Absolut	35	Ghalat
30.6	32.8	33.2	30.0	23.3	17.4	12.8	8.7	8.7	12.1	18.3	25.3	Max- Average		
23.9	26.2	26.6	23.6	17.6	11.9	7.5	3.9	4.0	7.2	12.7	19.0	Average		
17.3	19.7	19.9	17.1	11.8	6.4	2.3	-0.9	-0.6	2.3	7.1	12.7	Min- Average		
8.0	6.5	8.0	3.5	-6.0	-9.5	-12.5	-14.5	-13.0	-8.0	-6.5	2.0	Min- Absolut		
35.0	44.0	43.0	36.0	31.0	25.0	21.0	16.0	17.0	21.0	32.0	33.0	Max- Absolut	25	Kaftar
28.6	31.5	31.8	28.1	22.1	15.8	10.2	5.5	6.4	10.1	16.1	22.5	Max- Average		
19.8	22.7	23.1	19.7	15.2	9.4	4.5	-0.5	0.2	3.7	8.4	14.0	Average		
10.9	14.0	14.3	11.3	8.3	3.0	-1.1	-6.5	-6.0	-2.7	0.8	5.5	Min- Average		
3.0	9.0	5.0	2.0	1.0	-6.2	-21.2	-28.0	-28.0	-16.0	-7.0	-7.0	Min- Absolut		

Sep.	Ang.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Statistical characteristic	Statistical duration	Station
35.0	35.0	36.0	36.0	28.0	25.0	19.0	17.0	17.0	21.0	24.0	29.0	Max- Absolut	13	Kamhar
28.1	30.6	29.7	25.9	20.0	14.0	9.3	5.7	6.6	9.4	15.0	22.3	Max- Average		
19.7	22.4	22.3	18.7	13.8	8.4	4.2	0.7	1.5	4.3	8.8	14.8	Average		
11.4	14.1	14.9	11.4	7.7	2.9	-0.9	-4.4	-3.6	-0.7	2.6	7.2	Min- Average		
3.0	8.0	6.0	4.0	-2.0	-8.0	-11.0	-20.0	-19.0	-12.0	-8.0	-2.0	Min- Absolut		
38.0	41.0	41.0	39.0	35.0	35.0	35.0	21.0	22.0	23.0	29.0	37.0	Max- Absolut	32	Koshkak
31.7	34.4	34.9	31.0	25.3	25.3	25.3	12.2	11.4	14.7	20.8	27.3	Max- Average		
22.1	24.7	24.8	21.5	16.9	16.9	16.9	5.6	5.1	7.8	13.1	18.0	Average		
12.5	15.0	14.8	12.0	8.5	8.5	8.5	-0.9	-1.2	0.9	5.4	8.7	Min- Average		
4.0	5.0	5.0	3.9	-1.1	-1.1	-1.1	-11.1	-11.7	-9.0	-4.4	0.0	Min- Absolut		
39.0	42.0	44.0	40.5	37.0	30.0	29.0	22.0	20.0	22.0	29.0	40.0	Max- Absolut	17	God zereshk
33.2	36.8	37.1	33.7	24.5	19.9	15.6	10.3	10.5	13.8	20.8	28.6	Max- Average		
23.3	26.9	27.2	23.6	16.8	12.9	9.2	5.4	5.1	6.8	12.1	18.7	Average		
13.4	17.1	17.4	13.5	9.1	6.0	2.9	0.5	-0.4	-0.2	3.3	8.9	Min- Average		
5.0	10.0	8.0	5.0	-1.0	-3.0	-6.0	-14.0	-12.0	-20.0	-6.0	-1.0	Min- Absolut		
38.5	41.5	43.0	41.0	38.5	32.0	28.0	23.0	19.5	22.0	28.0	34.5	Max- Absolut	10	Laihana
33.4	36.9	38.1	36.5	31.7	25.5	18.9	15.3	12.1	13.7	18.6	25.9	Max- Average		
23.7	27.8	29.0	27.1	22.6	17.4	11.7	8.6	5.8	7.1	10.7	16.0	Average		
14.0	18.8	20.0	17.7	13.5	9.2	4.4	1.9	-0.6	0.4	2.8	6.2	Min- Average		
2.5	11.0	14.5	12.5	7.5	1.5	-2.0	-5.5	-7.0	-5.5	-2.5	4.5	Min- Absolut		
39.0	42.0	42.0	39.0	35.0	29.0	27.0	21.0	21.0	24.0	28.0	38.0	Max- Absolut	21	Madar Soliman
32.7	35.0	34.5	30.5	24.8	19.2	14.2	10.3	9.8	13.9	20.4	27.1	Max- Average		
19.9	23.0	22.8	19.0	14.7	10.3	6.0	2.5	2.3	4.9	9.4	15.0	Average		
7.1	11.0	11.1	7.5	4.6	1.4	-2.2	-5.3	-5.1	-4.0	-1.6	3.0	Min- Average		
-1.0	4.0	4.0	2.0	-3.0	-8.0	-12.0	-17.0	-22.0	-18.0	-12.0	-4.0	Min- Absolut		

Sep.	Ang.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Statistical characteristic	Statistical duration	Station
39.5	41.0	43.5	40.0	37.0	31.0	25.5	22.0	23.0	21.5	28.5	33.6	Max- Absolut	13	Shiraz- Zerehi
33.1	36.5	36.8	35.9	29.9	23.5	17.4	14.0	12.2	14.1	20.5	27.4	Max- Average		
23.9	27.9	28.6	36.9	21.8	16.2	10.9	7.4	5.9	7.9	13.2	18.5	Average		
14.8	19.3	20.5	18.0	13.7	8.9	4.5	0.7	-0.5	1.8	5.9	9.7	Min- Average		
9.0	11.5	11.5	11.0	5.0	0.0	-4.2	-6.5	-7.0	-5.0	-3.0	2.0	Min- Absolut		
38.5	41.0	42.5	41.0	37.0	35.0	29.5	24.0	20.5	21.5	27.5	39.0	Max- Absolut	26	Marv dasht
33.3	36.3	36.2	35.6	30.2	23.6	18.4	14.0	11.2	13.8	19.9	27.7	Max- Average		
23.2	27.0	27.5	25.7	21.4	15.7	11.1	7.1	5.3	7.1	11.5	18.0	Average		
13.1	17.8	18.9	15.9	12.7	7.8	3.9	0.3	-0.7	0.4	3.1	8.3	Min- Average		
0.5	8.5	12.0	8.0	0.0	-0.5	-5.5	-14.5	-8.5	-11.0	-8.0	0.0	Min- Absolut		
40.5	42.5	43.5	41.0	37.5	32.0	30.5	23.0	25.5	29.0	30.0	35.5	Max- Absolut	42	Mehrabad Remjerd
33.6	36.4	36.4	33.0	26.0	19.6	15.7	11.6	11.6	15.1	21.9	28.4	Max- Average		
23.3	26.2	26.4	23.0	17.7	12.5	8.6	5.5	5.1	7.4	12.6	19.3	Average		
13.1	16.0	16.4	13.0	9.4	5.5	1.5	-0.7	-1.4	-0.2	3.3	10.1	Min- Average		
3.5	5.0	7.5	5.0	1.0	-6.2	-8.0	-12.0	-14.5	-9.0	-6.0	-2.0	Min- Absolut		
38.0	41.5	43.0	42.0	37.0	31.0	26.0	21.0	21.5	21.0	27.0	33.0	Max- Absolut	20	Nahales tan
31.9	36.4	37.4	35.5	29.4	23.2	16.8	13.1	10.9	12.6	19.5	26.6	Max- Average		
22.1	26.3	27.3	24.9	19.9	14.6	9.4	5.8	4.0	5.7	10.8	16.8	Average		
12.3	16.3	17.2	14.3	10.4	6.9	1.9	-1.6	-2.9	-1.3	2.1	7.1	Min- Average		
5.5	10.5	10.5	7.5	2.0	-3.5	-8.5	-13.0	-14.0	-9.0	-6.0	-2.0	Min- Absolut		
42.0	41.0	42.5	41.5	39.0	35.0	32.0	25.0	22.0	23.0	27.2	33.5	Max- Absolut	42	Neyriz
32.7	35.8	37.1	35.8	31.3	24.6	19.7	15.3	12.3	14.8	19.9	27.2	Max- Average		
23.9	27.4	28.9	26.6	22.5	17.1	12.9	9.0	6.2	8.1	12.6	19.0	Average		
15.2	19.0	20.6	17.5	13.8	9.7	6.1	2.8	0.0	1.4	5.4	10.7	Min- Average		
6.0	8.0	11.0	9.0	1.5	-0.5	-4.0	-6.5	-9.0	-9.0	-6.0	2.0	Min- Absolut		

Table 3: Long term average temperature

Column	Station	Mean Temperature(C)	Altitude(m)
1	Ahmadabd Remjerd	15.6	1610
2	Ahmadabd Drodzan	15.7	1700
3	Arsanjan	14.8	1690
4	Abade Tashk	18.4	1600
5	Bajgah	14.0	1810
6	Bajgah(Agriculture Dep)	13.7	1850
7	Tangeboragh	15.3	2042
8	Jahanabad Bakhtegan	17.9	1580
9	Chambaian	10.9	2050
10	Chamriz	14.6	1840
11	Dehbid	12.2	2260
12	Dobaneh	19.0	1490
13	Zarghan	16.3	1596
14	Drodzan dam	16.9	1620
15	Sadeh	13.2	2160
16	Shieaz	18.1	1488
17	Abasabad	15.4	1700
18	Aliabadkamin	15.1	1790
19	Ghalat	15.6	2080
20	Kaftar	11.9	2315
21	Kamhat	12.0	2500
22	Koshkak	16.7	1600
23	Godzereshk	15.7	1600
24	Laihana	17.6	2350
25	Madar Soliman	12.8	1850
26	Shiraz-Zerhi	17.7	1516
27	Marvdasht	17.0	1599
28	Mehrabad Remjerd	16.0	1616
29	Nahalestan	16.4	1600

Table 4a: Altitude and monthly temperature in north of basin

Month	Correlation Equation	R	Confidence level
October	$T = .0131 H + 39.834$	0.79	0.42
November	$T = .0109 H + 29.675$	0.79	0.42
December	$T = .0078 H + 19.836$	0.82	0.44
January	$T = .0091 H + 19.586$	0.88	0.43
February	$T = .0116 H + 25.107$	0.81	0.42
March	$T = .0125 H + 30.071$	0.82	0.42
April	$T = .0139 H + 37.068$	0.83	0.42
May	$T = .018 H + 49.065$	0.85	0.42
June	$T = .0172 H + 52.793$	0.89	0.42
July	$T = .015 H + 52.044$	0.91	0.42
August	$T = .0133 H + 48.722$	0.90	0.42
September	$T = .0121 H + 43.194$	0.84	0.42
Annual	$T = .0128 H + 37.114$	0.92	0.41

Table 4 b: Altitude and monthly temperature in whole of basin except north

Month	Correlation Equation	R	Confidence level
October	$T = .0206 H + 60.825$	0.94	0.88
November	$T = .0168 H + 46.575$	0.92	0.88
December	$T = .0226 H + 54.777$	0.93	0.88
January	$T = .0114 H + 26.237$	0.97	0.88
February	$T = .012 H + 27.034$	0.95	0.95
March	$T = .0093 H + 25.621$	0.89	0.95
April	$T = .0085 H + 28.791$	0.84	0.95
May	$T = .0037 H + 23.717$	0.99	0.88
June	$T = .0084 H + 39.4$	0.86	0.88
July	$T = .0122 H + 51.114$	0.98	0.88
August	$T = .0179 H + 63.193$	0.90	0.88
September	$T = .0144 H + 53.072$	0.99	0.95
Annual	$T = .0128 H + 40.935$	0.97	0.88

Table 5: Correlation for stations with reconstructed data

column	Reference Station	Stations with reconstructed data	Correlation	R	Common statistical years
1	Jahanabad Bakhtegan	Arsanjan	$Y=0.8677x+58.279$	0.78	33
2	shiraz	kherameh	$Y=0.6273x+12.503$	0.78	41
3	Mehrabad- Ramjerd	Khosro Shirin	$Y=0.9495x+35.935$	0.72	22
4	Jamal beig	Hosseinabad Sarab	$Y=.5717x+129.01$	0.60	39
5	Shiraz	Jahan abad Bakhtegan	$Y=0.5572x+30.649$	0.75	36
6	Jamal beig	Kholar	$Y=1.0631x+96.558$	0.69	30
7	Dorodzan dam	Dozhord	$Y=1.3797x+13.333$	0.89	18
8	Dashtbal	Dashtak	$Y=1.3276x+22.001$	0.81	30
9	Ghalat	Doshman Ziari	$Y=0.7265x+3.9757$	0.92	20
10	Shiraz	Dobaneh	$Y=1.0688x+1.5536$	0.93	41
11	Mehrabad- Ramjerd	Dehbid	$Y=0.5881x+7.8022$	0.63	23
12	Chamriz	Sadeh	$Y=1.0092x+6.908$	0.77	23
13	Jamal beig	Dorodzan dam	$Y=0.788x+48.257$	0.81	24
14	Chamriz	Sefid	$Y=0.9871x+8.0578$	0.77	38
15	Dobaneh	Sarvestan	$Y=0.5629x+22.647$	0.82	27
16	Chamriz	Abas abad	$Y=0.918x+41.635$	0.92	11
17	Dobaneh	Sahlabad	$Y=0.5199x+14.666$	0.70	24
18	Mehrabad-Ramjerd	Sholband amir	$Y=0.8403x+40.931$	0.69	20
19	Dorodzan dam	Abas abad	$Y=0.9202x+33.751$	0.91	11
20	Jamal beig	Fenjan	$Y=0.7696x+55.555$	0.66	15
21	Dashtak	Fenjan	$Y=0.6367x+7.9573$	0.64	15
22	Jamal beig	Katori	$Y=0.599x+49.329$	0.77	17
23	Chamriz	Kaftar	$Y=0.9881x+35.639$	0.78	25
26	Jahanabad	Madar	$Y=0.5566x+74.784$	0.7609	75

	Kharameh	Soleiman			
27	Madar Soleiman	Maron	$Y=1.327 \times +137.91$	0.8231	12
28	Dashtak	Katori	$Y=0.5412 \times +76.386$	0.8676	17
29	Chamriz	Maron	$Y=1.0321 \times +117.86$	0.8335	14
30	Mehrabad-ramjerd	Ahmadabad chahar dange	$Y=0.9349 \times +41.743$	0.8173	22
31	Dashtbal	Emamzade esmail	$Y=0.9849 \times +118.05$	0.6117	33
32	Mehrabad-Ramjerd	Arsanjan	$Y=0.9075 \times +15.183$	0.8859	40
33	Shiraz	Ghalat	$Y=1.2192 \times +124.01$	0.7836	41
34	Dashtbal	Bidkal	$Y=1.0516 \times +38.694$	0.8859	13
35	Polekhan	Polekhan	$Y=0.5832 \times +11.675$	0.6475	19
36	Shiraz	Dozhord	$Y=1.3391 \times +117.96$	0.7249	18
37	Jamal beig	Chobkhale	$Y=1.1407 \times +83.454$	0.6648	40
38	Dashtbal	Abade tashk	$Y=0.6982 \times +5.9376$	0.7534	39
39	Dorodzan dam	Mehrabad ramjerd	$Y=1.0919 \times +41.114$	0.8968	20
40	Kharameh	Neyriz	$Y=0.8554 \times +7.4073$	0.6909	32
41	Jahanabad Bakhtegan	Horgan	$Y=1.2793 \times +20.09$	0.6775	34
42	Chamriz	Tange boragh	$Y=1.2637 \times +36.981$	0.9226	17
43	Sefid	Chenarrahdar	$Y=0.6379 \times +97.052$	0.58772	28
44	Chamriz	Chenar Sokhte	$Y=0.8741 \times +61.298$	0.6781	29
45	Dobaneh	Sahlabad	$Y=0.5016 \times +22.845$	0.7166	23
46	Dobaneh	Shiraz wa	$Y=0.8783 \times +17.839$	0.9002	39
47	Ghalat	Kelestan	$Y=0.839 \times +26.979$	0.8364	26
48	Ghalat	Koshk hezar beiza	$Y=0.5348 \times +38.043$	0.7605	18
49	Chobkhale	Menjan	$Y=0.429 \times +187.13$	0.5246	27
50	Shiraz	Bajgah	$Y=0.9481 \times +45.372$	0.9127	35

Table 6: Annual rainfall in the base period

Year	Mehrabad Ramjerd	Ahmad abad	Arsanjan	Dashtbal	Abade Tashk	Emam Zade Esmail	Bidkal	Polekhan	Poitalkh
1971-72	147.00	179.17	118.22	120.50	90.07	236.73	165.41	103.30	71.92
1972-73	567.00	571.83	499.37	453.50	322.57	564.70	515.59	449.20	273.65
1973-74	234.50	260.98	224.50	262.00	104.00	376.09	314.21	146.50	97.11
1974-75	265.00	289.49	242.50	262.00	104.00	376.09	314.21	146.50	97.11
1975-76	356.50	375.03	319.50	422.00	261.50	533.68	482.47	306.50	190.43
1976-77	468.00	479.28	415.50	497.00	338.00	607.55	561.34	450.50	274.41
1977-78	271.50	295.57	236.50	262.00	197.00	376.09	314.21	255.40	160.62
1978-79	557.50	562.95	438.00	542.00	255.00	651.87	608.66	406.50	248.75
1979-80	400.50	416.17	359.50	416.00	267.50	347.00	467.16	343.00	211.71
1980-81	433.50	447.02	486.00	473.00	359.00	587.50	536.10	349.20	215.33
1981-82	321.00	341.85	342.50	355.00	366.00	494.00	412.01	264.50	165.93
1982-83	293.00	315.67	204.50	387.00	289.00	320.00	445.66	224.80	142.78
1983-84	293.00	315.67	295.00	336.00	226.00	448.98	392.03	258.90	162.67
1984-85	241.00	267.05	180.00	269.80	152.50	459.50	322.42	185.00	119.57
1985-86	275.00	298.84	208.00	335.00	216.50	294.00	390.98	269.90	169.08
1986-87	379.00	396.07	247.50	308.00	181.50	419.00	362.59	273.00	170.89
1987-88	452.00	440.00	472.00	500.50	458.00	590.00	565.02	379.00	232.71
1988-89	466.50	490.00	421.50	468.00	299.00	443.50	530.84	385.40	236.44
1989-90	214.50	215.00	209.00	250.00	170.00	256.50	301.59	156.80	103.12
1990-91	363.00	405.00	312.00	408.00	278.00	509.50	467.75	343.30	211.89
1991-92	361.00	359.50	292.50	393.00	284.00	418.00	451.97	308.90	191.83
1992-93	398.50	497.50	331.50	393.00	263.00	689.50	451.97	287.50	179.35
1993-94	563.10	536.50	523.50	591.50	498.00	789.00	660.72	487.30	444.50
1994-95	217.00	240.00	222.50	199.50	195.00	263.00	248.49	167.00	197.50
1995-96	560.00	616.00	498.00	618.50	415.00	677.50	689.11	497.00	288.00
1996-97	622.50	463.50	499.00	567.50	446.00	643.00	635.48	472.00	298.00
1997-98	273.00	296.97	227.50	291.50	197.00	415.00	345.24	201.50	170.00
1998-99	294.50	471.50	398.50	504.50	297.00	631.00	569.23	420.50	221.00

1999-2000	384.50	401.21	365.00	311.00	281.00	401.00	365.74	342.00	229.50
2000-1	218.40	209.30	186.50	201.00	169.00	272.00	217.00	158.00	107.50
2001-2	263.20	272.50	192.50	211.50	133.50	339.50	272.50	208.00	114.00
2002-3	217.90	658.50	447.00	491.50	356.00	777.00	638.50	429.50	181.50
2003-4	351.20	346.50	290.50	328.00	269.00	491.00	405.00	314.80	152.00
2004-5	449.70	519.00	418.00	426.00	339.00	637.50	506.00	387.50	256.50
2005-6	531.30	462.00	489.50	544.50	404.50	540.00	498.00	474.00	288.11
2006-7	352.50	427.50	225.00	356.00	225.00	529.00	407.00	301.00	176.00
2007-8	394.90	452.00	333.50	348.00	270.50	632.00	477.50	308.00	146.00
2008-9	108.40	77.00	79.00	96.50	75.00	124.00	129.00	93.00	75.00
2009-10	218.60	245.50	169.00	201.00	148.00	360.00	229.00	242.00	98.50
2010-11	284.90	279.00	194.00	258.50	147.00	540.00	298.50	172.00	119.00
2011-12	226.60	253.59	164.00	226.00	200.00	348.00	281.50	170.00	112.00
2012-13	370.00	387.66	342.00	368.50	320.50	573.00	410.00	327.50	148.00
Average	360.97	377.03	312.38	364.36	260.32	476.92	421.86	298.69	185.87

Year	Shiraz	Jamal beig	Chob Khaleh	Hossein abad	Kherameh	Khosrosh irin	Kholar	Dozkord
1971-72	165.10	241.50	424.14	267.08	115.97	175.51	353.25	339.05
1972-73	549.40	711.50	1087.17	535.77	256.50	574.30	850.89	853.66
1973-74	211.20	350.50	675.00	329.39	88.00	258.59	468.66	400.78
1974-75	305.50	446.50	743.50	365.50	327.00	287.55	570.31	527.06
1975-76	400.50	595.50	1124.50	499.00	256.00	374.43	728.07	654.27
1976-77	514.40	686.00	1154.50	482.00	383.00	480.30	823.89	806.79
1977-78	256.60	330.00	639.00	324.00	165.00	293.72	446.96	461.57
1978-79	434.60	941.50	1236.00	603.00	275.00	565.28	1094.41	699.93
1979-80	449.50	377.00	556.00	444.00	354.00	416.21	496.72	719.89
1980-81	479.10	706.50	940.00	506.00	350.00	447.54	845.59	759.52
1981-82	313.20	576.50	713.00	371.00	270.00	340.72	707.95	537.37
1982-83	352.40	512.00	634.50	336.00	248.00	314.14	510.00	589.86

1983-84	377.90	452.50	709.50	396.00	272.00	314.14	675.00	624.01
1984-85	228.50	326.50	433.50	271.00	157.00	264.76	417.00	423.94
1985-86	322.20	387.00	473.50	365.00	216.00	297.05	555.00	594.42
1986-87	295.10	504.00	721.50	462.00	212.00	395.80	785.00	513.13
1987-88	560.80	656.00	1054.00	459.00	367.00	465.11	990.00	868.93
1988-89	453.50	527.50	831.00	685.00	273.50	478.00	899.00	725.24
1989-90	218.90	321.50	611.50	315.00	186.00	179.50	389.00	292.96
1990-91	419.90	611.00	1003.60	532.00	282.50	312.00	744.48	693.07
1991-92	422.00	481.00	824.00	361.00	262.00	304.00	423.00	582.70
1992-93	380.30	757.00	1390.50	444.00	228.00	512.00	694.50	791.72
1993-94	625.80	889.00	1171.00	666.00	478.00	529.00	988.50	1163.70
1994-95	201.70	249.50	391.50	196.00	167.50	159.50	317.00	329.50
1995-96	529.10	814.50	1179.00	580.00	346.50	617.50	115.50	970.00
1996-97	654.10	643.50	873.50	585.00	405.50	482.50	882.50	829.50
1997-98	242.30	304.50	598.50	311.00	162.50	291.50	527.50	494.50
1998-99	539.30	620.50	1188.00	616.50	263.50	488.00	801.00	836.00
1999-2000	352.00	548.00	768.50	429.00	263.00	365.50	702.50	610.00
2000-1	221.40	309.50	521.50	277.00	120.50	220.50	347.50	350.00
2001-2	266.30	325.00	685.50	372.00	130.00	296.00	410.50	465.00
2002-3	478.10	759.50	1436.50	585.50	269.00	623.00	919.50	909.50
2003-4	377.90	467.00	41.00	399.00	245.50	407.50	723.50	612.00
2004-5	415.00	550.00	1204.00	465.50	313.50	608.50	760.50	766.50
2005-6	586.00	427.50	815.50	557.00	394.50	410.00	741.00	556.50
2006-7	378.50	580.00	1081.00	494.00	287.00	510.50	723.00	765.50
2007-8	400.50	646.50	1032.00	583.00	193.50	505.00	586.00	536.60
2008-9	129.80	213.50	398.00	131.50	87.50	101.00	201.50	187.00
2009-10	199.60	377.00	519.00	282.50	113.80	250.50	406.00	401.50
2010-11	258.90	445.00	727.50	333.00	133.70	348.50	522.50	498.50
2011-12	234.60	621.50	824.50	310.00	149.50	251.09	553.50	473.70
2012-13	340.90	545.50	855.50	376.50	210.79	387.25	664.00	737.91
Average	370.06	519.90	816.90	426.26	244.54	378.68	648.86	617.41

Year	Dashtak	Ghalat	Doshman Ziari	Dehbid	Dobaneh	Drodzan dam	Chamriz	Sade	Sarvestan	Sefid
1971-72	181.98	325.30	232.35	94.25	178.01	238.56	265.50	274.04	122.85	150.00
1972-73	624.07	737.00	531.45	341.25	558.50	608.92	724.50	737.26	337.03	624.00
1973-74	369.83	437.50	313.87	145.71	225.50	324.45	358.50	367.90	149.58	289.50
1974-75	434.88	442.00	317.13	163.65	338.50	400.10	511.00	521.80	213.19	569.50
1975-76	582.25	521.50	374.89	217.46	413.00	517.51	649.50	661.57	255.12	616.00
1976-77	681.82	746.50	538.35	283.03	429.00	588.83	612.00	623.73	299.59	702.50
1977-78	369.83	466.00	334.57	167.47	275.00	308.30	375.00	384.55	177.44	336.00
1978-79	741.56	883.50	637.88	335.67	455.00	790.16	684.00	696.39	278.77	664.00
1979-80	574.28	704.50	507.84	243.34	429.00	345.33	532.00	542.99	264.13	372.00
1980-81	649.96	738.50	532.54	262.74	543.00	604.98	667.00	679.23	328.30	639.00
1981-82	493.30	487.50	350.19	196.58	389.50	502.54	477.50	487.99	241.90	416.00
1982-83	535.78	477.50	342.93	180.12	344.00	451.71	487.50	498.08	216.28	373.00
1983-84	490.80	459.50	329.85	180.12	393.50	404.83	444.50	454.69	244.15	343.00
1984-85	343.00	363.00	259.74	149.53	202.50	305.54	332.00	341.15	136.63	246.50
1985-86	363.00	516.10	370.97	169.53	339.00	353.21	324.00	351.24	213.47	371.50
1986-87	472.50	474.00	340.38	230.69	315.50	445.41	440.00	450.15	237.00	503.00
1987-88	674.00	628.00	452.26	273.62	569.00	565.19	550.00	229.00	449.00	600.50
1988-89	621.00	657.50	473.70	346.00	485.00	463.93	492.00	456.50	287.00	438.50
1989-90	269.00	379.00	271.36	161.00	265.00	222.00	284.00	356.50	123.00	325.00
1990-91	427.50	613.50	441.73	160.00	396.00	512.00	541.00	686.90	272.00	525.00
1991-92	547.00	583.00	419.57	190.00	413.00	432.00	443.50	456.00	329.00	464.50
1992-93	569.00	642.50	462.80	177.50	443.50	583.50	667.10	768.00	283.00	663.00
1993-94	931.00	866.30	663.00	366.00	744.50	719.50	823.00	817.50	491.00	745.00
1994-95	273.50	305.00	237.00	125.00	264.00	240.50	240.50	252.00	215.00	230.00
1995-96	897.00	910.50	641.00	422.00	604.50	631.50	700.00	793.25	336.00	801.00
1996-97	726.50	767.50	631.00	271.00	699.50	629.50	626.50	584.60	445.00	508.00
1997-98	343.00	413.00	346.00	174.00	253.00	366.00	337.00	369.80	180.00	353.00
1998-99	696.50	878.00	587.50	224.00	553.50	617.00	651.50	549.00	302.50	594.00
1999-2000	491.00	679.50	423.00	256.50	414.00	463.00	456.00	431.20	237.00	440.00
2000-1	241.00	335.50	202.00	108.00	249.50	247.50	247.00	235.50	140.00	246.50
2001-2	326.50	442.00	301.00	146.50	256.00	317.00	351.50	325.00	166.00	286.50

2002-3	828.00	861.00	625.00	443.50	439.50	704.50	669.50	796.30	295.50	792.00
2003-4	426.00	684.00	419.00	224.50	401.00	433.50	424.00	486.50	238.50	519.00
2004-5	614.00	724.50	503.00	353.00	457.00	565.00	637.00	735.50	283.00	712.00
2005-6	459.00	761.00	563.00	207.50	745.50	495.00	571.00	488.00	339.50	318.50
2006-7	480.00	662.00	453.00	194.00	346.50	558.00	477.00	565.80	207.00	616.00
2007-8	593.00	626.50	552.00	274.60	460.50	539.50	537.50	569.80	218.50	647.00
2008-9	127.50	216.50	123.00	44.50	147.50	148.00	132.50	159.75	101.00	175.00
2009-10	322.00	401.00	251.00	208.00	192.50	247.50	267.00	259.55	125.00	255.50
2010-11	464.50	416.00	302.00	165.50	306.50	445.00	358.00	367.38	145.50	345.32
2011-12	347.00	391.70	301.50	141.07	247.50	353.00	390.50	400.18	190.50	377.40
2012-13	607.00	515.00	423.00	225.40	405.00	544.50	487.00	497.57	224.00	427.66
Average	505.72	575.19	413.89	220.09	397.08	457.95	482.55	493.09	246.17	468.25

Year	Sahl abad	Sholband amir	Abas abad	Fenjan	Katori	Kaftar	Kamhar	Gosh negan	Abade Tashk	Maron	Neyriz
1971-72	107.21	164.46	285.36	130.30	193.98	297.98	531.06	338.10	342.08	391.64	91.87
1972-73	305.03	517.38	706.73	492.02	475.51	751.52	1501.04	113.97	104.00	864.96	212.00
1973-74	131.90	237.98	370.74	214.19	259.28	389.87	756.01	203.87	199.50	487.55	67.87
1974-75	190.65	263.61	510.73	288.07	316.78	540.56	954.14	262.24	261.50	644.80	272.31
1975-76	229.38	340.50	637.88	402.74	406.03	677.41	1261.64	334.26	338.00	787.62	211.58
1976-77	270.46	434.19	603.45	472.39	460.24	640.36	1448.42	201.52	197.00	748.95	320.21
1977-78	157.64	269.07	385.89	198.41	247.00	406.18	713.71	227.88	225.00	504.56	133.73
1978-79	251.22	509.40	669.55	669.02	613.28	711.50	1975.72	267.89	267.50	823.20	227.83
1979-80	237.70	377.47	530.01	234.58	275.15	561.31	810.70	354.03	359.00	666.46	275.00
1980-81	296.97	405.20	653.94	488.17	472.52	694.70	1490.73	360.62	366.00	805.67	270.70
1981-82	217.17	310.67	479.98	388.12	394.65	507.46	1222.43	288.13	289.00	610.26	197.00
1982-83	193.51	287.14	489.16	388.48	356.01	517.34	1089.32	228.82	226.00	620.57	157.00
1983-84	219.25	287.14	449.69	320.45	342.01	474.85	966.52	159.63	152.50	576.23	216.00
1984-85	119.95	243.44	364.41	226.35	262.02	363.69	706.48	219.88	216.50	460.22	145.00

1985-86	190.91	272.01	355.59	239.08	272.84	231.00	831.34	186.93	181.50	470.53	113.50
1986-87	178.69	359.40	445.56	308.80	332.10	444.50	1072.81	447.23	458.00	571.59	226.00
1987-88	394.50	420.75	546.54	437.09	441.15	637.50	1386.50	297.54	299.00	685.02	489.00
1988-89	232.00	432.93	493.29	403.35	412.47	545.50	1121.31	161.50	170.00	625.21	246.00
1989-90	178.00	221.18	305.10	179.23	221.97	335.00	696.16	312.00	278.00	413.81	136.50
1990-91	184.00	354.96	538.27	280.15	307.75	415.50	1293.63	308.00	284.00	675.74	116.00
1991-92	245.50	344.28	448.77	356.23	372.42	426.50	1025.34	298.00	263.00	575.20	200.00
1992-93	257.00	375.79	654.03	370.24	384.33	768.50	1594.95	464.50	498.00	805.77	205.50
1993-94	512.00	205.00	797.15	600.73	579.00	717.00	1867.37	201.00	195.00	966.54	370.00
1994-95	186.60	194.00	262.41	248.50	244.00	323.50	636.50	417.50	415.00	365.86	142.00
1995-96	364.00	559.00	684.24	650.50	542.00	771.00	1770.50	541.00	446.00	839.70	335.50
1996-97	418.00	577.50	616.76	407.50	466.50	497.00	1183.00	216.00	197.00	763.91	395.50
1997-98	181.50	227.50	351.00	226.35	281.50	410.50	655.50	358.00	297.00	465.37	191.50
1998-99	203.00	492.50	639.71	355.00	422.50	653.00	1356.00	172.00	281.00	789.69	161.50
1999-2000	194.50	430.00	460.24	225.00	368.00	474.00	972.50	172.00	169.00	703.50	246.50
2000-1	127.00	214.00	268.38	148.50	178.00	268.00	509.50	179.00	133.50	333.00	96.00
2001-2	157.50	231.00	364.31	270.00	231.50	330.00	746.50	288.00	356.00	399.50	100.00
2002-3	220.50	557.50	677.00	554.50	507.50	903.40	1750.50	273.00	269.00	785.00	185.50
2003-4	214.00	355.50	445.50	385.50	329.50	540.50	1150.00	270.50	339.00	664.50	182.50
2004-5	320.00	440.50	626.00	437.50	412.00	774.00	1536.50	424.00	404.50	678.50	284.00
2005-6	286.50	541.50	514.00	11.50	493.50	519.00	1337.00	265.00	225.00	774.00	298.00
2006-7	168.50	344.50	500.00	320.50	268.00	540.00	1322.50	257.00	270.50	636.50	159.00
2007-8	201.50	378.00	471.50	545.00	414.00	622.00	1144.50	78.00	75.00	599.00	204.00
2008-9	60.50	111.00	135.00	83.00	99.50	118.50	345.00	133.00	148.00	207.50	41.00
2009-10	195.00	182.00	320.40	272.50	227.50	395.50	671.00	177.80	147.00	446.50	144.50
2010-11	105.00	324.50	383.00	303.70	327.77	389.38	964.50	209.00	200.00	515.50	113.50
2011-12	157.37	245.50	358.80	228.89	264.81	421.49	1028.00	216.70	320.50	461.00	120.48
2012-13	225.22	428.00	572.00	394.43	404.89	516.84	1040.00	230.50	333.00	639.00	172.90
Average	221.12	344.26	484.62	335.87	354.31	512.46	1105.64	264.66	266.57	615.47	201.77

Year	Jahan abad kharamah	Madar soliman	Horga n	Tange Boragh	Chenarr ahdar	Cheanar Sokhte	Sahl Abad	Shiraz	Kele stan	Choshk Hezar	Baseri	Menja n	Bajga h
1971-72	265.50	222.56	119.00	372.49	108.60	212.60	112.14	165.10	299.91	212.01	219.63	369.09	173.3
1972-73	724.50	478.04	365.50	952.53	485.50	648.50	302.99	549.40	645.32	432.19	561.82	582.00	566.3
1973-74	358.50	274.33	65.50	490.02	229.50	321.50	135.96	211.20	381.00	272.02	288.97	503.00	272.4
1974-75	511.00	359.21	211.00	682.73	370.00	300.50	192.64	305.50	444.50	274.42	402.65	517.00	325.8
1975-76	649.50	436.30	272.50	857.75	380.00	515.00	230.01	400.50	464.52	316.94	505.91	721.00	295.4
1976-77	612.00	415.42	415.50	810.37	465.50	568.50	269.63	510.40	589.50	437.27	477.95	533.50	490.6
1977-78	375.00	283.51	171.70	510.87	295.50	382.50	160.79	256.60	354.00	287.26	301.27	387.00	304.5
1978-79	684.00	455.50	239.50	901.35	378.00	534.00	251.07	434.60	657.00	510.54	531.63	795.00	514.0
1979-80	532.00	370.90	298.00	709.27	283.50	440.00	238.03	449.50	516.00	414.81	418.31	484.00	479.5
1980-81	667.00	446.04	361.00	879.87	486.50	602.00	295.21	479.10	580.00	432.99	518.95	709.00	517.0
1981-82	477.50	340.56	197.50	640.40	285.30	424.00	218.22	313.20	460.00	256.98	383.50	529.00	377.0
1982-83	487.50	346.13	301.00	653.03	325.50	497.00	195.40	352.40	450.00	268.50	369.50	504.50	351.0
1983-84	444.50	322.19	303.00	598.70	384.50	489.50	220.22	377.90	406.00	284.00	340.50	485.00	379.5
1984-85	332.00	259.58	146.00	456.53	227.00	299.50	124.42	228.50	341.00	295.00	236.50	259.00	236.0
1985-86	342.00	265.14	204.50	469.17	314.50	441.00	192.89	322.20	420.50	325.00	309.00	422.50	382.0
1986-87	440.00	259.00	208.00	593.01	264.50	338.00	184.45	295.10	429.00	353.50	338.50	464.00	338.0
1987-88	550.00	407.00	473.50	732.02	550.50	717.00	394.50	560.80	578.00	427.00	458.00	676.00	553.5
1988-89	492.00	397.00	171.00	658.72	508.50	575.00	232.00	453.50	654.00	451.50	460.00	601.00	484.0
1989-90	287.00	239.00	165.50	399.66	263.50	343.00	178.00	218.90	377.00	184.00	206.00	301.50	220.0
1990-91	541.00	352.50	157.50	720.64	532.00	614.00	184.00	419.90	598.00	373.50	398.50	674.00	487.0
1991-92	443.50	355.50	231.00	597.43	481.50	549.00	245.50	422.00	436.00	319.00	384.00	446.00	413.5
1992-93	667.10	345.00	210.50	880.00	438.80	586.00	257.00	380.30	652.00	290.50	466.50	739.00	417.9
1993-94	823.00	407.00	547.00	1163.70	707.50	787.00	511.50	625.80	765.00	549.00	649.00	863.00	610.4
1994-95	240.50	196.50	271.00	352.50	273.00	263.60	186.60	201.70	258.50	188.00	199.00	292.00	239.0
1995-96	700.00	476.50	538.50	970.00	749.00	774.00	364.00	529.10	900.00	470.00	516.00	770.00	570.2
1996-97	626.50	464.00	517.00	829.50	295.00	769.00	418.00	654.10	803.00	554.50	485.00	378.00	646.5
1997-98	337.00	281.50	249.50	494.50	703.70	352.00	181.50	242.30	401.00	263.50	281.00	762.50	257.0
1998-99	651.50	495.50	331.50	836.00	518.40	690.00	203.00	539.30	783.00	474.00	539.00	504.00	496.0
1999-2000	456.00	347.50	491.50	610.00	377.73	608.00	194.50	352.00	488.00	332.50	354.50	516.82	436.0
2000-1	247.00	183.00	91.50	350.00	254.29	277.20	127.00	221.40	308.46	217.47	205.84	410.85	214.0
2001-2	351.50	250.00	168.50	465.00	279.81	368.54	162.00	266.30	397.82	274.42	283.75	481.21	275.5

2002-3	669.50	519.00	277.00	909.50	602.27	646.51	220.50	478.10	749.36	498.51	520.82	803.39	603.5
2003-4	424.00	374.00	463.00	612.00	428.12	431.92	214.00	377.90	600.86	403.85	377.80	204.72	398.5
2004-5	637.00	402.00	475.50	766.50	551.24	618.10	252.08	415.00	649.94	435.13	496.59	703.65	415.6
2005-6	571.00	446.00	431.00	555.50	300.22	560.41	286.50	586.00	665.46	445.03	447.38	536.98	497.0
2006-7	477.00	293.00	211.30	765.50	490.00	478.24	168.50	153.00	582.40	392.08	377.31	650.88	368.5
2007-8	537.50	448.00	343.50	657.00	509.77	531.13	201.50	400.50	552.61	373.10	422.41	629.86	425.09
2008-9	132.50	98.00	68.50	187.00	208.68	177.12	60.50	129.80	208.62	153.83	120.48	357.87	168.44
2009-10	267.00	252.90	254.00	401.50	260.03	294.68	195.00	195.40	363.42	252.50	220.75	409.78	234.61
2010-11	358.00	218.50	236.50	489.39	317.33	374.23	176.59	287.04	376.00	260.52	288.59	499.23	290.84
2011-12	390.50	292.14	198.12	530.46	337.80	402.63	160.53	258.93	355.62	247.52	312.82	548.56	267.80
2012-13	487.00	345.85	234.59	652.40	398.56	486.98	225.99	373.55	459.06	313.47	384.76	554.14	368.58
Average	482.55	343.36	278.27	646.77	395.74	483.08	222.02	366.61	509.56	345.66	381.44	537.61	389.55

Reconstructed data

Table 7: Rainfall in plains and altitude in study areas

<i>Studies area</i>		Elavation & Plain	Area (square kilometer)	Volume Rainfall (square million meters)	Avearage Rainfall (mm)
Name	Code				
Tavabee Arsanjan	4301	Elevation	64.4	25.55	397.0
		Plain	210. 6	72.14	342.5
Arsanjan	4302	Elevation	595.9	232.45	390.1
		Plain	283.1	97.25	343.5
Seydan-Farough	4303	Elevation	196.7	79.77	406.6
		Plain	172.3	60.77	352.6
South Maharlu lake	4304	Elevation	110.5	35.38	320.3
		Plain	52.5	14.97	285.0
Abadetashk-Jahanabad	4305	Elevation	625.08	183.26	292.9
		Plain	1311.2	296.99	226.5
Khanekat	4306	Elevation	186.4	63.87	342.6
		Plain	196.6	56.14	285.6
Khir	4307	Elevation	84.5	26.21	310.3
		Plain	144.5	38.35	265.4
Estahban	4308	Elevation	259.5	80.51	310.3
		Plain	157.5	44.99	285.7
Neyriz	4309	Elevation	388.7	88.23	227.0
		Plain	630.3	112.20	178.0
Tangehana-Pichakan	4310	Elevation	555.3	138.74	249.9
		Plain	1524.7	350.69	230.0
Marvdasht-Khrameh	4311	Elevation	1488.5	662.74	445.2
		Plain	2452.5	889.94	362.7
Darian	4312	Elevation	140.8	54.93	390.2
		Plain	193.2	66.72	345.3
Saadat abad	4313	Elevation	525.5	215.447	410.0
		Plain	197.5	73.445	371.8
Sarpaniran	4314	Elevation	267.5	89.957	336.3
		Plain	178.5	56.748	317.9
Ghaderabad-Madarsoliman	4315	Elevation	1220.7	421.872	345.6
		Plain	1687.3	566.383	335.7

Dehbid	4316	Elevation	537.5	169.254	314.9
		Plain	1352.5	352.939	261.0
Namdan	4317	Elevation	957.3	510.262	533.0
		Plain	1845.7	920.615	498.8
Beiza-Zarghan	4318	Elevation	722.3	244.734	338.8
		Plain	1015.7	313.046	308.2
Dozkord-Kamphirouz	4319	Elevation	1777.5	1217.567	685.0
		Plain	316.5	163.140	515.4
Khosroshirin	4320	Elevation	286.8	115.884	404.1
		Plain	338.2	129.305	382.3
Asopas	4321	Elevation	752.6	362.206	481.3
		Plain	870.4	388.446	446.3
Bakan	4322	Elevation	192.5	94.142	489.0
		Plain	151.5	69.272	457.3
Shiraz	4323	Elevation	829.4	343.802	414.5
		Plain	598.6	199.022	332.5
Gharebagh	4324	Elevation	223.5	82.043	367.1
		Plain	229.5	66.214	288.5
Kavar maharlu	4325	Elevation	175.9	56.459	320.9
		Plain	147.1	41.339	281.1
Sarvestan	4326	Elevation	573.4	200.192	394.2
		Plain	1067.6	298.702	279.8
Goshnegan	4327	Elevation	124.7	37.496	300.8
		Plain	302.3	79.457	262.8

Table 8: Rainfall in basin and sub basin

Column	Basin	Station	Basin area (square kilometer)	Precipitation volume (square million meters)	Average rainfall (mm)
1	Arsanjan	-	879.0	288.3	328.0
2	Abade Tashk	-	1480.0	385.7	260.6
3	Abade Tashk	Abade Tashk	95.9	328.3	3422.2
4	Abbalangan	Dehkadesefid-Gavgodar	1623.0	758.7	467.05
5	Babahaji	Polefasa	453.0	145.4	321.0
6	Bakan	-	344.0	174.0	505.8
7	Arsanjan-khafrak	-	275.0	82.6	300.5
8	Estahban	-	229.0	83.7	365.5
9	Sivand	Dashtbal	5988.7	2215.3	369.9
10	Sivand	Polekhan	6618.2	2321.5	350.8
11	Polekhan-Drodzan	Drodzan	4565.4	2118.3	464.0
12	Polekhan-Drodzan	Jonaki	5637.2	2729.5	484.2
13	Tangehana-Pichakan	-	1278.0	297.4	232.7
14	South lake	-	163.0	46.3	284.2
15	Chamriz	Menjan	203.0	125.3	617.4
16	Chamriz	Chamriz	738.4	356.4	482.6
17	Chamriz	Khanmin	3777.6	1846.0	488.7
18	Chenarrahdar	Chenarrahdar	350.2	122.8	350.5
19	Khanekat	-	383.0	96.4	251.6
20	Khoshkerood	Chenarsokhte	146.8	60.3	410.6
21	Khoshkerood	Chenarsokhte(Nahrazam)	473.4	163.6	345.6
22	Khoshkerood	Eghbalabad	963.8	5057.1	5247.0
23	Khafrak olia	-	369.0	138.0	374.0
24	Drodzan	Polekhan	14507.9	7127.1	491.3
25	Doshmanziari	-	1738.0	636.1	366.0
26	Sefid river	Khosroshirin	23.0	4.2	184.4
27	Sefid river	Dehkadesefid-sefid	624.7	227.8	364.7
28	Estahban	Mian bashi	30.5	8.0	263.9
29	Estahban	-	417.0	127.2	305.0

30	Sarpaniran	-	446.0	1408.9	3159.0
31	Sarvestsn	-	1641.0	410.4	250.1
32	Middel sivand 1	Rahmatabad	4953.6	1766.7	356.7
33	Middel sivand 2	Tangebologhi	4797.8	1704.7	355.3
34	Shadkam	-	2804.0	857.7	305.9
35	Shorshirin	Jamalbeig(Shorkharestan)	196.0	118.8	606.3
36	Shorshirin	Jamalbeig(Shorkharestan)	371.0	246.4	664.1
37	Shol	Badamak	481.0	234.4	487.4
38	West kavar	-	323.0	92.1	285.0
39	Goghnegan	-	427.0	122.1	286.0
40	Marvdasht-kheramrh	Kheirabad	15336.6	6448.9	420.5
41	Marvdasht-kheramrh	Siahzar	16669.7	7486.0	449.1
42	Marvdasht-kheramrh	Hasanabad	16387.9	7532.7	459.7
43	Tarbor	-	334.0	140.8	421.6
44	Neyriz	-	1019.0	216.0	212.0

Table 9: Rainfall return period

Column	Station	T						
		2	3	5	10	25	50	100
1	Jahan abad-Bakhtegan	237.22	284.02	329.94	379.23	410.25	460.95	487.16
2	Chamriz	482.31	550.24	614.86	684.21	758.14	758.14	848.82
3	Chobkhaleh	835.24	976.76	1119.97	1280.93	1458.04	1573.93	1687.26
4	Hossein abad sarab	436.24	491.44	543.97	600.33	660.42	699.23	734.13
5	Dashtbal	365.4	420.81	427.85	527.98	585.95	622.94	655.91
6	Dobaneh	378.25	442.64	510.19	589.87	683.4	748.71	810.85
7	Dehbid	222.68	262.27	299.96	340.42	383.54	411.39	436.43
9	Shiraz	360.31	422.59	458.9	557.41	636.52	688.53	735.53
10	Abas abad	460.83	529.71	592.25	665.59	740.56	788.54	832.54
11	Ghalat	572.34	652.71	729.18	811.24	898.72	955.22	1006.02
12	Madar soliman	332.88	374.53	414.15	456.67	502	531.27	557.6
13	Mehrabad ramjerd	355.48	410.6	464.96	525.44	592.38	637	678.06
14	Neyriz	190.67	229.06	270.44	320.81	382.25	426.73	470.28
15	Emamzade esmail	471.15	537	600.27	668.86	742.76	790.91	834.51
16	Horgan	266.98	330.12	397.21	474.67	561.46	618.7	670.26
17	Maron	592.29	670.71	727.87	769.49	793.93	801.28	804.08
18	Goshnegan	271.22	321.01	368.39	419.23	473.44	508.44	539.92
19	Katori	356.74	416.32	473.01	533.84	598.69	640.58	678.24
20	Kamhar	1048.5	1261.63	1468.14	1685.69	1903.88	2033.31	2140.19
21	Sholband Amir	349.76	415.68	479.76	550.01	626.6	677.02	723
22	Sahlabad	213.88	256.37	305.27	368.19	449.6	511.51	574.44
23	Sarvestan	244.09	288.07	333.64	386.95	449.28	492.81	534.3
24	Sadeh	476.95	578.1	681.19	796.77	922.33	1002.95	1074.14
25	Doshmanziari	427.35	498.18	565.57	637.89	714.99	764.78	809.56
26	Dashtak	481.54	567.51	655.95	758.36	876.4	957.68	1034.24
27	Dozkord	605.62	716.72	830.5	961.64	1112.22	1215.51	1312.58
28	Kholar	593.39	707.72	816.48	933.21	1057.65	1138.02	1210.29
29	Khosroshirin	390.27	466.85	536.16	602.99	662.49	693.59	716.52
30	Kharameh	242.96	283.39	323.55	368.52	418.63	452.22	483.25
31	Polekhan	293.61	346.66	398.24	453.21	509.55	543.85	527.89
32	Poletalkh	164.33	206.11	250.58	304.02	368.33	414.35	459.03
33	Bidkal	367.18	438.53	505.92	574.76	641.18	679.1	709.39
34	Ahmadabad-Chahardange	388.34	450.8	510.22	573.99	641.98	685.88	725.37
35	koshkak	416.21	469.23	519.67	573.8	631.5	668.77	702.28

Table 10: Rainfall parameters

Column	Station	Parameter	October	November	December	January	February	March	April	May	June	July	August	September	Annual	Statistic (year)
1	Jamal beig	Max	37.0	15.0	5.5	8.0	109.5	253.6	308.0	211.5	411.5	447.5	184.0	36.0	518.3	40
		Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	16.0	10.0	0.0	0.0	0.0		
		Ave	2.4	36.4	97.1	101.6	98.2	90.2	68.6	20.7	0.3	0.3	0.7	1.0		
		Percent	0.5	7.0	18.7	19.5	19.0	17.4	13.2	4.0	0.1	0.1	0.1	0.2		
2	Jahanabad Bakhtegan	Max	7.5	54.0	295.0	160.0	134.5	175.0	101.0	60.0	4.5	2.5	2.5	2.0	238.0	36
		Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	0.0	0.0	0.0	0.0		
		Ave	0.5	9.2	42.6	52.5	48.8	41.5	31.9	10.4	0.4	0.1	0.1	0.6		
		Percent	0.2	3.9	17.9	22.1	20.5	17.4	13.4	4.4	0.2	0.0	0.0	0.3		
3	Chamriz	Max	8.0	11.0	41.0	13.5	114.5	192.5	262.5	209.5	369.0	294.5	166.0	40.6	471.0	40
		Min	0.0	0.0	0.0	10.0	14.5	2.0	0.5	0.0	0.0	0.0	0.0	0.0		
		Ave	2.2	31.6	85.1	99.9	92.9	76.1	60.6	19.7	0.8	1.2	0.7	0.2		
		Percent	0.5	6.7	18.1	21.2	19.7	16.6	12.9	4.2	0.2	0.3	0.1	0.5		
4	Chobkhale	Max	7.0	28.0	20.0	25.0	202.5	388.0	405.5	424.5	604.5	713.0	304.0	71.5	820.0	39
		Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.0	0.0	1.5	0.0	0.0		
		Ave	0.5	1.7	1.6	1.6	30.7	113.9	151.1	150.9	161.0	142.4	60.4	4.2		
		Percent	0.1	0.2	0.2	0.2	3.7	13.9	18.4	18.4	19.6	17.4	7.4	0.5		
5	Hossein abad sarab	Max	0.0	20.0	0.0	18.0	70.0	183.0	236.0	220.0	284.0	295.0	138.0	27.0	430.0	39
		Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	8.0	0.0	0.0	0.0		
		Ave	0.0	0.9	0.0	0.9	0.2	54.5	67.2	84.0	99.2	79.5	28.2	1.5		
		Percent	0.0	0.2	0.0	0.2	0.1	12.7	15.6	19.5	23.1	18.5	6.6	0.3		
6	Kharameh	Max	15.0	35.0	19.0	30.0	62.0	83.5	144.0	148.0	185.0	250.0	66.0	12.0	247.7	40
		Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	25.0	0.0	0.0	0.0		
		Ave	0.6	1.4	0.7	1.0	12.8	32.6	39.8	48.3	55.1	42.8	11.8	0.7		
		Percent	0.2	0.6	0.3	0.4	5.2	13.2	16.1	19.5	22.2	17.3	4.8	0.3		
7	Khosro shirin	Max	21.0	134.5	296.5	315.0	171.0	195.5	181.0	61.5	24.5	7.0	8.0	3.5	384.4	22
		Min	0.0	0.0	0.0	10.5	8.5	0.0	2.5	0.0	0.0	0.0	0.0	0.0		
		Ave	2.8	20.9	82.5	76.2	71.0	62.0	55.0	13.7	1.6	0.9	0.5	0.2		
		Percent	0.7	5.3	21.3	19.7	18.3	16.0	14.2	3.5	0.4	0.2	0.1	0.1		

8	Kholar	Max	52.0	158.0	375.0	456.0	349.0	390.0	234.0	88.0	12.0	22.0	18.0	10.5	593.0	31
		Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	4.6	39.5	102.5	121.5	117.4	103.0	81.5	19.4	0.9	1.5	0.9	0.8		
		Percent	0.8	6.7	17.3	20.5	19.8	17.4	13.7	3.3	3.3	0.3	3.3	0.1		
9	Dozkord	Max	40.0	220.0	441.5	439.5	231.0	344.5	238.0	65.2	34.0	10.0	0.0	2.0	628.0	18
		Min	0.0	0.0	0.0	24.5	32.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0		
		Ave	3.5	33.4	117.8	144.8	117.5	100.6	88.6	18.7	2.5	0.6	0.0	0.2		
		Percent	0.6	5.3	18.8	23.1	18.7	16.0	14.1	3.0	0.4	0.1	0.0	0.0		
10	Dastbal	Max	33.0	100.0	333.0	298.0	222.0	165.0	145.0	85.0	2.5	14.0	13.0	10.0	364.4	40
		Min	0.0	0.0	0.0	3.0	11.0	0.0	3.5	0.0	0.0	0.0	0.0	0.0		
		Ave	1.5	18.4	66.2	83.8	74.7	56.4	48.7	13.5	0.1	0.3	0.6	0.2		
		Percent	0.4	5.0	18.2	23.0	20.5	15.5	13.4	3.7	0.0	0.1	0.2	0.1		

Column	Station	Parameter	October	November	December	January	February	March	April	May	June	July	August	September	Annual	Statistic (year)
11	Dashtak	Max	33.0	189.0	382.0	345.0	271.0	259.0	245.0	95.0	3.0	24.0	0.0	4.0	500.0	30
		Min	0.0	0.0	0.0	12.0	14.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0		
		Ave	2.9	35.9	91.6	104.2	90.8	83.1	71.1	18.4	0.1	1.8	0.0	0.1		
		Percent	0.6	7.2	18.3	20.8	18.2	16.6	14.2	3.7	0.0	0.4	0.0	0.0		
12	Doshmanziari	Max	29.0	131.0	298.0	317.0	202.0	243.0	225.0	56.0	3.0	16.0	0.0	0.0	427.4	20
		Min	0.0	0.0	0.0	9.0	28.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	2.1	25.0	81.0	99.7	88.0	62.5	59.6	8.7	0.2	0.8	0.0	0.0		
		Percent	0.5	5.8	19.0	23.3	20.6	14.6	13.9	2.0	0.0	0.2	0.0	0.0		
13	Dehbid	Max	26.0	117.0	156.5	215.0	101.0	149.0	130.5	51.0	18.0	3.5	8.0	0.0	241.2	24
		Min	0.0	0.0	0.0	3.0	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	2.4	13.9	37.6	54.2	45.2	41.0	33.7	14.4	1.1	0.2	0.5	0.0		
		Percent	1.0	5.8	15.6	22.2	18.7	17.0	14.0	6.0	0.5	0.1	0.2	0.0		
14	Dobaneh	Max	20.0	105.5	411.0	272.0	256.5	202.5	128.5	64.5	5.0	8.0	17.0	4.0	402.4	40
		Min	0.0	0.0	0.0	5.0	9.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	1.6	19.4	75.1	97.0	86.8	63.6	44.5	12.7	0.3	0.4	0.8	0.3		
		Percent	0.4	4.8	18.7	24.1	21.6	15.9	11.1	3.2	0.1	0.1	0.2	0.1		
15	Sabzposhan	Max	0.0	120.0	348.0	177.0	178.0	90.0	136.5	9.0	0.0	0.0	0.0	0.0	373.5	8
		Min	0.0	0.0	0.0	16.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	0.0	26.9	85.8	86.3	88.3	36.3	47.8	2.3	0.0	0.0	0.0	0.0		
		Percent	0.0	7.2	23.0	23.1	23.6	9.7	12.8	0.6	0.0	0.0	0.0	0.0		
16	Drodzan Dam	Max	24.0	146.0	277.5	302.0	240.0	264.5	194.5	75.5	8.5	10.0	4.5	0.0	469.2	24
		Min	0.0	0.0	0.0	11.0	22.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0		
		Ave	2.8	26.5	89.8	102.7	99.7	74.4	62.2	9.9	0.5	0.5	0.2	00.00		
		Percent	0.6	5.6	19.1	21.9	21.2	15.9	13.3	2.1	0.1	0.1	0.0			
	Sadeh	Max	34.5	130.0	398.5	429.0	215.5	248.5	202.0	109.5	16.3	13.0	1.0	0.0	505.1	23
		Min	0.0	0.0	0.0	14.5	13.0	1.0	4.3	0.0	0.0	0.0	0.0	0.0		

Column	Station	Parameter	October	November	December	January	February	March	April	May	June	July	August	September	Annual	Statistic (year)
21	Sholband amir	Max	16.0	92.0	301.0	275. 0	217.0	211.0	134.0	64.0	0.0	2.5	5.0	0.0	352.0	20
		Min	0.0	0.0	0.0	0.0	23.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	1.2	16.8	68.1	77.9	84.4	53.9	43.2	6.2	0.0	0.1	0.3	0.0		
		Percent	0.3	4.8	19.4	22.1	24.0	15.3	12.3	1.8	0.0	0.0	0.1	0.0		
22	Shiraz	Max	23.6	118. 0	330.0	261. 1	185.5	141.1	124.5	74.9	6.5	22.0	17.0	1.2	376.5	40
		Min	0.0	0.0	0.0	4.0	5.7	0.0	0.5	0.0	0.0	0.0	0.0	0.0		
		Ave	1.3	21.8	71.8	89.9	75.8	54.3	46.3	13.2	0.3	0.6	0.9	0.1		
		Percent	0.3	5.8	19.1	23.9	20.1	14.4	12.3	3.5	0.1	0.2	0.2	0.0		
23	Abas abad	Max	0.0	79.5	226.5	355. 0	197.5	163.0	127.0	24.5	1.0	1.0	0.0	0.0	454.8	11
		Min	0.0	0.0	0.3	11.5	37.3	3.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	0.0	28.0	97.1	107. 9	89.0	58.4	66.9	6.5	0.1	0.1	0.0	0.9		
		Percent	0.0	7.4	25.8	28.7	23.6	15.5	17.8	1.7	0.0	0.0	0.0	0.2		
24	Aliabad Khoshk	Max	0.0	132. 5	425.5	253. 0	184.0	132.5	186.0	20.5	5.5	4.0	9.0	15.0	511.5	8
		Min	0.0	0.0	0.0	18.0	54.5	0.0	7.0	0.0	0.0	0.0	0.0	0.0		
		Ave	0.0	36.3	107.9	108. 8	113.8	64.5	68.7	6.1	1.4	0.7	1.1	2.2		
		Percent	0.0	9.6	28.7	28.9	30.2	17.1	18.2	1.6	0.4	0.2	0.3	0.6		
25	Galat	Max	2.7	34.1	110.3	122. 0	117.6	99.2	72.7	19.2	1.0	0.3	1.3	0.6	581.3	40
		Min	0.0	0.0	0.0	12.0	20.0	0.0	2.5	0.0	0.0	0.0	0.0	0.8		
		Ave	2.7	34.1	110.3	122. 0	117.6	99.2	72.7	19.2	1.0	0.3	1.3	0.8		
		Percent	0.5	5.9	19.0	21.0	20.2	17.1	12.5	3.3	0.2	0.1	0.2	0.1		
26	Katori	Max	15.5	66.0	282.0	220. 0	187.0	196.5	160.5	61.0	6.0	6.5	9.5	3.5	356.7	17
		Min	0.0	0.0	0.0	3.5	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	1.9	12.6	69.2	72.9	71.5	60.5	54.0	11.5	0.9	0.4	1.1	0.2		

		Percent	0.5	3.5	19.4	20.4	20.0	17.0	15.1	3.2	0.3	0.1	0.3	0.1		
27	Kaftar	Max	43.0	140.0	384.0	353.0	252.5	262.5	248.5	133.5	32.0	3.0	12.5	6.0	506.4	25
		Min	0.0	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	3.3	26.8	91.4	93.2	91.5	93.5	76.5	26.3	2.5	0.2	0.8	0.4		
		Percent	0.7	5.3	18.0	18.4	18.1	18.5	15.1	5.2	0.5	0.0	0.2	0.1		
28	Kamhar	Max	31.5	296.0	826.5	766.0	439.5	501.5	314.5	523.0	33.5	22.0	38.5	11.0	####	19
		Min	0.0	0.0	5.0	38.0	46.0	14.0	18.0	0.0	0.0	0.0	0.0	0.0		
		Ave	5.1	73.0	188.2	197.0	198.7	172.9	154.5	600.2	1.8	2.1	4.3	1.3		
		Percent	0.5	6.9	17.8	18.6	18.8	16.3	14.6	56.7	0.2	0.2	0.4	0.1		
29	Goshnegan	Max	16.5	83.5	187.0	181.0	163.0	127.0	98.5	47.0	7.0	6.0	3.0	2.0	266.4	24
		Min	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	1.4	12.4	48.3	67.3	56.9	40.7	92.2	9.3	0.3	0.3	0.2	0.1		
		Percent	0.5	4.7	18.1	25.3	21.4	15.3	11.0	3.5	0.1	0.1	0.1	0.0		
30	Madar soleiman	Max	32.0	63.0	287.5	215.5	277.5	176.5	200.5	50.5	8.0	5.0	18.5	3.0	340.3	24
		Min	0.0	0.0	0.0	0.0	14.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0		
		Ave	2.0	13.2	58.0	70.2	77.0	55.8	49.0	13.5	0.4	0.2	0.8	0.2		
		Percent	0.1	3.9	17.0	20.6	22.6	16.4	14.4	4.0	0.1	0.1	0.2	0.1		

Column	Station	Parameter	October	November	December	January	February	March	April	May	June	July	August	September	Annual	Statistic (year)
31	Maroon	Max	14.5	138.0	395.0	380.5	229.5	323.5	214.0	20.0	5.0	4.0	9.0	30.0	554.3	14
		Min	0.0	0.0	1.0	20.5	58.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	1.3	37.4	112.8	132.5	119.8	88.1	60.8	6.5	0.6	0.8	1.6	2.9		
		Percent	0.2	6.7	20.4	23.9	21.6	15.9	11.0	1.2	0.1	0.1	0.3	0.5		
32	Fakhrabad Ramjerd	Max	32.0	114.0	303.6	269.6	200.1	200.5	158.9	71.0	3.5	25.0	11.0	3.0	366.2	40
		Min	0.0	0.0	0.0	3.5	11.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0		
		Ave	1.7	22.1	69.1	80.5	71.6	55.4	49.2	0.2	0.2	1.3	0.7	0.2		
		Percent	0.5	6.0	18.9	22.0	19.6	15.1	13.4	0.1	0.1	0.4	0.2	0.1		

33	Neyriz	Max	4.0	74.0	422.5	151.0	149.0	155.0	78.0	42.0	37.0	4.0	27.5	1.5	207.6	32
		Min	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	0.1	7.6	43.6	42.9	35.7	37.8	26.4	9.7	1.3	0.2	2.3	0.1		
		Percent	0.0	3.7	21.0	20.7	17.2	18.2	12.7	4.7	0.6	0.1	1.1	0.0		
34	Horgan	Max	4.0	60.0	374.5	287.0	260.0	283.0	140.5	57.5	8.0	16.0	32.0	6.0	285.5	40
		Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	0.1	9.6	45.3	59.8	59.2	59.1	35.7	11.7	0.3	0.7	3.7	0.2		
		Percent	0.0	3.4	15.9	20.9	20.7	20.7	12.5	4.1	0.1	0.2	1.3	0.1		
35	Abade Tashk	Max	10.0	51.0	305.0	177.0	164.5	144.0	86.0	62.0	5.0	7.0	8.0	9.5	263.0	40
		Min	0.0	0.0	0.0	3.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	0.7	9.8	46.5	58.9	60.4	43.7	31.6	10.2	0.3	0.3	0.4	0.2		
		Percent	0.3	3.7	17.7	22.4	23.0	16.6	12.0	3.9	0.1	0.1	0.1	0.1		
36	Ahmadabad Chahardange	Max	30.0	113.5	267.5	278.0	179.5	216.0	159.0	90.0	9.5	11.5	2.0	0.0	394.7	23
		Min	0.0	0.0	0.0	6.5	19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	2.6	21.2	81.2	82.5	76.5	66.2	47.0	14.4	0.7	0.5	0.1	0.0		
		Percent	0.7	5.4	20.6	20.9	19.4	16.8	11.9	3.6	0.2	0.1	0.0	0.0		
37	Arsanjan	Max	1.2	12.0	55.2	71.7	65.2	52.0	39.3	13.1	0.2	0.5	1.4	0.8	312.6	40
		Min	0.0	0.0	0.0	2.0	4.5	0.0	0.5	0.0	0.0	0.0	0.0	0.0		
		Ave	1.2	12.0	55.2	71.7	65.2	52.0	39.3	13.1	0.2	0.5	1.4	0.8		
		Percent	0.4	3.8	17.7	22.9	20.8	16.6	12.6	4.2	0.1	0.1	0.5	0.3		
38	Emamzade Esmacil	Max	32.0	130.0	339.0	321.0	240.5	266.0	241.0	106.0	12.0	0.0	0.0	0.0	479.1	34
		Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	1.5	25.0	93.0	91.5	90.2	87.8	76.1	13.5	0.7	0.0	0.0	0.0		
		Percent	0.3	5.2	19.4	19.1	18.8	18.3	15.9	2.8	0.1	0.0	0.0	0.0		
39	Bidkal	Max	8.5	82.0	271.0	288.5	169.5	109.0	198.5	16.0	2.0	0.0	2.0	4.0	366.9	13
		Min	0.0	0.0	0.0	11.0	28.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0		
		Ave	0.7	22.6	81.5	89.8	74.3	37.0	56.1	4.2	0.2	0.0	0.2	0.4		
		Percent	0.2	6.2	22.2	24.5	20.3	10.1	15.3	1.2	0.0	0.0	0.0	0.1		
40	Poltalkh	Max	5.0	47.5	113.0	181.0	109.5	128.5	78.0	46.0	0.0	2.0	27.0	0.0	176.7	20
		Min	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	0.6	8.2	32.6	38.8	35.4	28.4	23.1	7.9	0.0	0.1	1.7	0.0		

Column	Station	Parameter	October	November	December	January	February	March	April	May	June	July	August	September	Annual	Statistic (year)
41	Polekhan	Max	28.0	87.0	310.0	258.0	147.0	170.0	115.5	77.5	0.0	3.0	41.0	2.0	289.7	40
		Min	0.0	0.0	0.0	1.5	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	1.0	18.0	55.3	69.9	58.0	43.4	39.3	12.0	0.0	0.1	1.6	0.1		
		Percent	0.3	6.2	19.1	24.1	20.0	15.0	13.6	4.1	0.0	0.0	0.6	0.0		
42	Tangebragh Dozkord	Max	40.0	220.0	441.5	439.5	231.0	344.5	238.5	65.2	34.0	10.0	0.0	2.0	607.0	17
		Min	0.0	0.0	0.0	46.0	32.0	0.0	5.0	0.0	0.0	0.0	0.0	0.0		
		Ave	3.7	34.3	118.0	151.9	118.6	103.4	91.0	18.2	2.7	0.6	0.0	0.0		
		Percent	0.6	5.7	19.4	25.0	19.5	17.0	15.0	3.0	0.4	0.1	0.0	0.0		
43	Chenarrahdar	Max	31.0	99.5	270.0	227.0	212.5	213.0	130.0	63.5	7.0	11.0	5.0	5.5	403.8	28
		Min	0.0	0.0	0.0	5.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.0		
		Ave	1.6	18.7	64.2	98.4	83.9	73.8	48.1	13.5	0.6	0.4	0.3	0.2		
		Percent	0.4	4.6	15.9	24.4	20.8	18.1	11.9	3.3	0.1	0.1	0.1	0.1		
44	Chenar Sokhteh	Max	37.0	147.0	400.0	237.0	257.0	286.0	179.0	86.0	8.0	30.0	7.0	0.0	504.9	29
		Min	0.0	0.0	0.0	9.0	17.0	0.0	8.0	0.0	0.0	0.0	0.0	0.0		
		Ave	2.0	26.2	87.2	119.3	101.1	86.2	59.7	20.6	0.5	1.0	1.0	0.0		
		Percent	0.4	5.2	17.3	23.6	20.0	17.1	11.8	4.1	0.1	0.2	0.2	0.0		
45	Sahlabad	Max	6.0	52.0	307.0	199.0	158.5	131.5	80.0	57.0	5.5	6.0	38.0	8.0	223.8	24
		Min	0.0	0.0	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	0.8	10.2	44.6	46.5	40.7	40.8	29.6	14.2	0.7	0.4	4.4	0.7		
		Percent	0.4	4.6	19.9	20.8	18.2	18.2	13.2	6.3	0.3	0.2	2.0	0.3		
46	Shiraz	Max	23.6	105.5	330.0	261.1	185.5	141.1	124.5	74.9	6.5	22.0	17.0	1.2	362.0	39
		Min	0.0	0.0	0.0	4.0	5.7	0.0	0.5	0.0	0.0	0.0	0.0	0.0		
		Ave	1.2	19.5	69.4	90.4	75.3	54.6	45.7	13.1	0.3	0.7	1.0	0.1		
		Percent	0.3	5.4	19.2	25.0	20.8	15.1	12.6	3.6	0.0	0.2	0.3	0.0		
47	Kelestan	Max	41.0	145.0	346.0	271.0	293.0	279.0	198.0	79.0	16.0	7.0	5.0	0.0	527.8	26
		Min	0.0	0.0	0.0	15.0	4.0	0.0	6.0	0.0	0.0	0.0	0.0	0.0		

		Ave	3.0	28.4	93.6	109. 8	106.2	103.0	95.1	17.5	0.6	0.3	0.2	0.0		
		Percent	0.6	5.4	17.7	20.8	20.1	19.5	18.0	3.3	0.1	0.1	0.0	0.0		
48	Khoshk hezar	Max	26.0	94.0	258.5	171. 5	186.5	185.0	158.0	65.0	0.0	3.0	0.0	0.0	350.0	19
		Min	0.0	0.0	0.0	0.0	13.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Ave	2.5	19.1	65.8	70.0	64.6	63.2	45.3	19.8	0.0	0.3	0.0	0.0		
		Percent	0.7	5.5	18.8	20.0	18.5	18.1	12.9	5.7	0.0	0.1	0.0	0.0		
49	Koshkak	Max	33.0	136. 0	296.0	259. 0	211.0	189.5	120.5	72.0	6.5	7.0	18.0	0.0	416.2	29
		Min	0.0	0.0	0.0	8.5	16.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0		
		Ave	2.2	26.9	89.1	93.2	19.5	62.6	46.2	12.9	0.6	0.5	0.9	0.0		
		Percent	0.5	6.5	21.4	22.4	4.7	15.0	11.1	3.1	0.1	0.1	0.2	0.0		
50	Bajgah	Max	5.0	7.0	7.0	12.0	70.9	120.5	189.5	200.7	259.0	306.0	118.0	30.5	399.9	36
		Min	0.0	0.0	0.0	0.0	0.0	3.0	0.0	19.9	4.0	0.0	0.0	0.0		
		Ave	0.4	0.4	0.2	0.6	15.2	44.0	57.0	88.0	94.3	74.8	23.6	1.5		
		Percent	0.1	0.1	0.0	0.2	3.8	11.0	14.3	22.0	23.6	18.7	5.9	0.4		

Table 11: Seasonal distribution in representative stations

Column	Station	Annual	Fall		Winter		Spring		Summer	
			Rainfall (mm)	Percent	Rainfall (mm)	Percent	Rainfall (mm)	Percent	Rainfall (mm)	Percent
1	Abade Tashk	260.3	80.6	31.0	156.4	60.1	22.6	8.7	0.7	0.3
2	Arsanjan	312.4	82.7	26.5	198.6	63.6	28.6	9.2	2.6	0.8
3	Debid	225.8	63.7	28.2	117.2	51.9	43.2	19.1	1.7	0.8
4	Drodzan dam	458.0	140.3	30.6	269.3	58.8	46.2	10.1	2.2	0.5
5	Sivand	215.3	69.4	32.2	118.9	55.2	24.4	11.3	2.6	1.2
6	Shiraz	370.1	135.7	36.7	192.3	52.0	40.6	11.0	1.7	0.5
7	Ghalat	575.2	184.0	32.0	330.5	57.5	58.5	10.2	2.2	0.4
8	Kohenjan	301.2	92.3	30.6	175.4	58.2	29.4	90.8	4.1	1.4
9	Neyriz	201.8	51.1	25.3	127.4	63.1	19.9	9.9	3.5	1.7
10	Estahban	360.0	82.7	23.0	207.7	57.7	60.9	16.9	8.7	2.4
11	Jamalbeig	519.9	142.7	27.4	289.7	55.7	86.5	16.6	1.2	0.2
12	Jahanabad Bakhtegan	236.8	53.6	22.6	140.1	59.2	41.2	17.4	1.7	0.7
13	Chamriz	482.6	123.5	25.6	273.7	56.7	82.9	17.2	2.5	0.5
14	Hosseinabad Sarab	426.3	115.3	27.0	244.7	57.4	65.2	15.3	1.1	0.3
15	Dashtbal	364.4	88.2	24.2	211.0	57.9	64.1	17.6	1.2	0.3
16	Sefid	468.2	133.6	28.5	252.2	53.9	81.6	17.4	0.8	0.2
17	Kaftar	506.4	123.7	24.4	280.6	55.4	101.1	20.0	1.1	0.2
18	Madar Soliman	341.2	90.5	26.5	192.5	56.4	56.8	16.6	1.4	0.4
19	Mehrabad Ramjerd	361.0	91.6	25.4	205.8	27.0	61.5	17.0	2.1	0.6
20	Polekhan	298.7	73.5	24.6	170.0	56.9	52.5	17.6	2.9	1.0
21	Chobkhale	816.9	216.0	26.4	453.7	55.5	143.5	17.6	3.7	0.5
22	Abbasabad	484.6	119.3	24.6	284.2	58.6	79.3	16.4	0.6	0.1

Table 12: Average monthly evaporation

Column	Station	Duration	October	November	December	January	February	March	April	May	June	July	August	September	Annual evaporation
1	Ahmadabad Rumjerd	42	166.36	106.38	69.41	53.46	79.19	88.82	122.47	179.24	251.71	302.24	288.56	238.01	1954.84
2	Bajgah	32	160.94	101.91	60.67	50.71	73.24	102.07	156.07	209.82	269.76	288.11	262.58	224.70	1956.39
3	Tange boragh	17	168.91	110.47	60.04	31.55	38.52	54.47	85.34	146.01	228.67	282.96	284.02	242.95	1733.91
4	Jahanabad Bakhtegan	36	227.68	135.55	75.05	57.84	82.45	128.27	192.83	283.93	387.73	426.40	400.92	330.81	2729.45
5	Chambian	13	220.11	134.54	71.24	42.67	59.14	102.30	161.41	218.63	272.95	328.08	347.60	310.01	2268.67
6	Chamriz	42	177.37	102.47	64.14	49.06	56.76	94.76	135.02	182.05	258.04	299.78	277.03	247.26	1951.23
7	Dobaneh	36	251.35	147.05	85.11	66.03	89.49	134.41	197.48	287.10	401.22	426.95	403.06	347.24	2836.86
8	Zarghan	23	199.00	139.60	83.30	70.00	81.50	116.90	172.80	257.80	238.70	378.10	359.80	299.30	2496.74
9	Roniz	30	213.00	138.80	87.50	69.10	79.00	121.20	172.60	248.30	337.80	408.00	400.40	280.78	2625.80
10	Drodzan dam	21	192.80	109.40	65.10	58.50	73.70	89.70	137.10	221.40	299.80	324.30	322.10	278.30	2172.20
11	Sadeh	22	183.43	101.16	60.93	58.54	47.79	98.19	146.69	207.82	296.94.09	330.25	333.74	277.60	2085.16
12	Shiraz	14	208.74	119.48	78.83	65.12	77.09	129.39	207.18	321.66	406.56	425.06	379.72	300.54	2722.37
13	Shiraz(Sinoptic)	25	194.40	125.00	75.50	74.10	10.70	115.00	154.20	240.40	227.00	346.50	322.30	279.30	2343.10
14	Abasabad	11	215.89	133.88	69.41	53.49	78.19	139.63	180.11	266.54	363.60	367.61	326.41	280.40	2475.17
15	Ghalat	42	259.71	155.26	92.44	66.82	77.59	124.84	196.60	283.29	410.36	442.15	396.91	352.03	2863.42
16	Kaftar	27	199.75	113.37	69.50	45.78	57.65	92.72	147.15	212.75	314.49	362.03	357.31	297.15	2267.45
17	Kamhar	19	174.13	107.79	55.78	51.55	49.58	89.22	133.98	195.80	250.69	273.97	264.85	228.57	1875.91
18	Koshkak	32	199.71	114.48	63.06	40.17	49.50	84.33	129.87	197.25	279.52	309.63	319.23	273.20	2035.58

19	Gogzereshk	12	200. 54	108. 29	53.2 2	32.2 3	49.6 0	96.3 8	142. 63	220. 00	322.75	366. 29	344. 08	292. 00	2228.46
20	Madar soliman	24	152. 01	95.9 5	54.8 8	36.3 2	42.9 8	81.1 0	137. 12	189. 08	252.36	286. 10	271. 02	219. 29	1818.20
21	Mazijan	23	199. 00	139. 60	83.3 0	70.0 0	81.5 0	116. 90	172. 80	257. 80	238.70	278. 10	259. 80	299. 30	2496.74
22	Maron	14	227. 29	132. 69	75.4 3	57.9 1	68.6 7	125. 83	173. 98	248. 95	339.26	366. 87	341. 27	307. 86	2440.31

Table 13: Correlation applied in reconstruction of annual evaporation

Column	Base Station	Refrence Station	Relationship	Common Year	R
1	Roniz	Kaftar	$Y=1.376 \times -900.66$	26	0.610
2	Bajgah	Dridzan dam	$Y= -0.6704 \times +3513.8$	4	0.717
3	Chamriz	Dashtbal	$Y=0.3111 \times +1174.4$	11	0.525
4	Chamriz	Kamhar	$Y=0.3984 \times +1135.1$	19	0.420
5	Chamriz	Godesereshk	$Y=0.4721 \times +1073.5$	12	0.510
6	Chamriz	Chambaian	$Y=0.3779 \times +1206.9$	13	0.411
7	Bajgah	Shiraz e	$Y=1.4945 \times +33.09$	8	0.879
8	Ghalat	Abaas abad	$Y=0.8985 \times +126.31$	11	0.633
9	Dobaneh	Sadeh	$Y=0.8482 \times +78.935$	20	0.484
10	Koshk	Tange boragh	$Y=0.52 \times +504.77$	12	0.534
11	Mazijan	Sadeh	$Y=-0.5455 \times +3707$	20	0.455
12	Mehrabad Ramjerd	Madar soliman	$Y=0.4813 \times +872.58$	24	0.490
13	Ghalat	Maron	$Y=1.157 \times -675.41$	14	0.561
14	Dashtbal	Kaftar	$Y=0.7221 \times +327.61$	12	0.560
15	Kaftar	Drodzan dam	$Y=0.5503 \times +895.24$	4	0.870
16	Shiraz	Mehrabad Ramjerd	$Y=0.9875 \times +917.67$	8	0.448
17	Ghalat	Dobaneh	$Y=1.3051 \times -956.2$	21	0.718
18	Sadeh	Drodzan dam	$Y=1.6694 \times -2077.4$	4	0.940
19	Kaftar	Siraz Sinoptic	$Y=0.9331 \times +729.72$	14	0.479
20	Tange boragh	Koshkak	$Y=1.0259 \times +324.22$	11	0.532
21	Godezereshk	Jahanabad Bakhtegan	$Y=1.3358 \times +410.17$	6	0.765
22	Roniz	Kaftar	$Y=0.2253 \times +1743.8$	22	0.532
23	Chamriz	Tange boragh	$Y=1.2253 \times +1843.8$	17	0.623
24	Kaftar	Mazijan	$Y=-6279 \times +3963.1$	23	0.407

Table 14: Evaporation in plains and elevation

Column	Study area	Code	Elevation		Plain	
			Area (KM2)	Evaporation (KM2)	Area (KM2)	Evaporation (KM2)
1	Tavabee Arsanjan	4301	67.37	2150.19	210.63	2333.09
2	Arsanjan	4302	595.879	2200.00	283.12	2477.74
3	Seydan-Farough	4303	1900.66	1900.66	172.34	2278.25
4	South Tashk lake	4304	110.462	2657.12	52.54	2400.79
5	Abade Tashk-Jahanabad	4305	625.783	2491.78	1311.22	2640.95
6	Khanekate	4306	186.42	2476.93	196.58	2766.11
7	Khir	4307	84.4832	2156.61	144.52	2465.02
8	Estahban	4308	259.514	2194.11	157.49	2380.82
9	Neyriz	4309	388.669	2489.35	630.33	2691.93
10	Tangehana-Pichakan	4310	555.262	2450.00	1524.74	2760.18
11	Marvdasht-Kherameh	4311	1488.51	2004.71	2452.49	2210.42
12	Darian	4312	140.78	1460.50	193.22	1725.64
13	Saadatabad	4313	525.445	1636.07	197.55	1979.81
14	Sarpaniran	4314	267.49	2089.86	178.51	2000.54
15	Ghaderabad-Madarsoliman	4315	1220.73	2171.64	1687.27	2292.05
16	Dehbid	4316	537.485	2152.92	1352.51	2412.48
17	Namdan	4317	957.34	2189.58	1845.66	2488.08
18	Beiza-Zarghan	4318	722.276	2178.26	1015.72	2313.6
19	Dozkord-Kamphiroz	4319	1777.47	2229.62	316.35	2278.79
20	Khosroshirin	4320	286.77	2181.14	338.23	2338.73
21	Asopas	4321	752.63	2000.82	870.37	2198.91
22	Bakan	4322	192.52	1380.79	151.48	1577.15
23	Shiraz	4323	829.439	2403.09	598.56	2766.39
24	Gareebagh	4324	223.49	2542.53	229.51	2609.79
25	Kavar Aharlu	4325	175.94	2208.12	147.06	2381.23
26	Sarvestan	4326	573.37	2175.04	1067.63	2253.72
27	Goshnegan	4327	124.654	2372.59	302.35	2539.58

Table 15: Evaporation from plain and Elevation by using evaporation coefficient

Column	Study area	Code	Elevation		Plain	
			Area (KM2)	Evaporation (KM2)	Area (KM2)	Evaporation (KM2)
1	Tavabee Arsanjan	4301	64.37	1505.13	210.63	1633.163
2	Arsanjan	4302	595.879	1540.00	283.12	1734.418
3	Seydan-Farough	4303	1900.66	1330.46	172.34	1594.775
4	South Tashk lake	4304	110.462	1859.98	52.54	1680.553
5	Abade Tashk-Jahanabad	4305	625.783	1477.25	1311.22	1848.665
6	Khanekate	4306	186.42	1733.85	196.58	1936.277
7	Khir	4307	84.4832	1509.63	144.52	1725.514
8	Estahban	4308	259.514	1535.88	157.49	1666.574
9	Neyriz	4309	388.669	1742.55	630.33	1884.351
10	Tangehana-Pichakan	4310	555.262	1715.00	1524.74	1932.126
11	Marvdasht-Kherameh	4311	1488.51	1403.30	2452.49	1547.294
12	Darian	4312	140.78	1022.35	193.22	1207.948
13	Saadatabad	4313	525.455	1145.25	197.55	1385.867
14	Sarpaniran	4314	267.49	1462.90	178.51	1400.378
15	Ghaderabad-Madarsoliman	4315	1220.73	1520.15	1687.27	1604.435
16	Dehbid	4316	537.485	1507.04	1352.51	1688.736
17	Namdan	4317	957.34	1532.71	1845.66	1741.656
18	Beiza-Zarghan	4318	722.276	1524.78	1015.72	1619.52
19	Dozkord-Kamphiroz	4319	1777.47	1560.73	316.53	1595.153
20	Khosroshirin	4320	286.77	1526.80	338.23	1637.111
21	Asopas	4321	752.63	1400.57	870.37	1539.237
22	Bakan	4322	192.52	966.55	151.48	1104.005
23	Shiraz	4323	829.439	1682.16	598.56	1936.473
24	Gareebagh	4324	223.49	1779.77	229.51	1826.853
25	Kavar Aharlu	4325	175.94	1545.68	147.06	1666.861
26	Sarvestan	4326	573.37	1522.53	1067.63	1577.604
27	Goshnegan	4327	124.654	1660.81	302.35	1777.706

Table 16: Actual and potential evapotranspiration in Jahanabad Bakhtegan station

Month Method	Oct	Nov	Dec	Janu	Febr	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Hargreaves-Samani	135.2	92.8	61.3	44.3	38.9	66.7	113.0	152.6	202.1	230.8	241.3	210.4	1589.2
Evaporation Pan	159.4	94.9	52.5	40.5	57.7	89.8	135.0	198.7	241.4	298.5	280.6	231.6	1910.6
Shiraz University(1)	195.7	130.9	84.5	60.4	61.5	93.7	135.3	186.3	235.9	247.2	273.8	224.1	1929.3
Shiraz University(2)	178.0	138.9	107.4	93.3	97.4	118.1	142.1	177.1	63.5	238.6	263.6	214.7	1832.6
Actul Evapotranspiration Torent-Whit method	0.2	3.5	9.4	12.5	22.0	27.4	29.4	11.6	2.4	0.0	0.1	0.0	118.5

Table 17: Actual and potential evapotranspiration in Chamriz station

Mont Method	Oct	Nov	Dec	Janu	Febr	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Hargreaves-Samani	125.7	82.2	53.3	37.4	37.7	57.5	99.2	133.9	182.3	209.1	217.7	188.6	1424.5
Evaporation Pan	126.3	72.4	45.4	33.1	38.8	66.8	96.6	129.0	183.3	212.9	197.2	176.1	1378.2
Shiraz University(1)	101.9	75.9	55.4	49.9	52.1	80.6	100.3	125.4	160.4	186.3	201.7	176.6	1366.4
Shiraz University(2)	97.4	64.2	41.9	29.6	30.2	47.0	83.2	113.1	153.3	182.7	194.0	159.2	1195.8
Actul Evapotranspiration Torent-Whit method	2.0	7.2	11.7	12.4	17.3	28.5	37.7	14.6	0.7	0.7	0.2	0.0	133.0

Table 18: Actual and potential evapotranspiration in Dobaneh station

Mont Method	Oct	Nov	Dec	Janu	Febr	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Hargreaves-Samani	118.7	80.9	53.0	38.9	40.1	59.8	102.2	137.3	180.1	206.2	213.3	187.5	1417.9
Evaporation Pan	175.9	102.9	59.6	46.2	62.6	94.1	138.5	201.0	280.9	298.9	282.1	243.1	1958.8
Shiraz University(1)	159.5	108.8	76.3	55.4	57.3	67.1	136.8	205.1	249.1	287.9	312.7	239.5	1955.4
Shiraz University(2)	133.2	86.7	56.2	41.9	43.8	65.4	117.0	163.8	221.4	263.4	276.3	223.8	1692.8
Actul Evapotranspiration Torent-Whit method	1.3	8.3	15.4	18.7	27.3	40.5	36.3	13.5	0.5	0.3	0.5	0.4	162.9

Table 19: Actual and potential evapotranspiration in Shiraz station

Mont Method	Oct	Nov	Dec	Janu	Febr	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Hargreaves-Samani	122.8	75.9	50.3	48.0	68.8	93.3	141.0	188.6	228.1	227.6	211.8	176.6	1632.9
Evaporation Pan	134.1	78.8	42.6	46.4	65.3	88.5	118.7	187.5	251.8	263.3	241.7	203.9	1722.7
Shiraz University(1)	132.2	74.4	49.3	47.8	69.5	96.4	148.0	200.5	244.3	246.7	226.9	183.1	1710.0
Shiraz University(2)	118.1	72.6	50.1	48.9	68.7	95.6	145.3	196.2	238.8	251.3	229.6	178.5	1693.8
Actul Evapotranspiration Torent-Whit method	0.9	9.5	15.6	17.6	21.7	37.7	35.8	11.3	0.5	0.0	0.5	0.2	151.3

Table 20: Actual and potential evapotranspiration in Kaftar station

Mont Method	Oct	Nov	Dec	Janu	Febr	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Hargreaves-Samani	104.6	69.2	43.9	30.9	30.4	48.2	85.1	118.1	164.2	194.7	202.3	170.4	1262.0
Evaporation Pan	141.1	83.6	49.4	31.6	34.9	64.5	103.6	156.1	221.5	254.9	252.4	212.3	1605.9
Shiraz University(1)	151.3	98.5	61.8	42.9	42.5	68.8	127.2	178.8	250.7	302.7	315.5	259.2	1899.7
Shiraz University(2)	97.7	63.6	40.1	26.7	27.0	46.4	85.9	122.6	166.4	204.4	210.2	168.4	1259.4
Actul Evapotranspiration Torent-Whit method	2.3	11.0	16.2	8.1	9.6	25.6	39.7	23.1	2.5	0.1	1.0	0.3	139.7

Table 21: Actual and potential evapotranspiration in Sadeh station

Mont Method	Oct	Nov	Dec	Janu	Febr	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Hargreaves-Samani	116.0	63.2	30.5	9.0	10.2	36.1	81.6	134.2	200.5	258.6	270.0	211.8	1421.5
Evaporation Pan	129.7	70.4	42.2	39.8	33.6	68.7	102.1	146.9	209.2	233.0	235.4	196.3	1507.3
Shiraz University(1)	170.6	95.4	48.7	17.7	19.4	57.2	126.7	152.1	200.2	216.9	236.0	247.2	1588.0
Shiraz University(2)	119.6	77.8	50.0	36.3	37.5	56.8	100.6	140.2	191.8	235.8	246.3	200.4	1493.1
Actul Evapotranspiration Torent-Whit method	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 22: Actual and potential evapotranspiration in Madar Soliman station

Mont Method	Oct	Nov	Dec	Janu	Febr	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Hargreaves-Samani	128.1	83.8	52.1	35.7	37.2	58.7	103.9	142.4	196.1	233.4	247.0	211.1	1529.4
Evaporation Pan	121.6	76.8	43.9	29.1	34.4	64.9	109.7	151.3	201.9	228.9	216.8	175.4	1454.6
Shiraz University(1)	176.8	113.9	70.8	48.5	50.6	80.4	89.0	105.6	120.4	148.7	198.9	181.0	1384.5
Shiraz University(2)	100.1	64.9	42.0	29.3	31.1	48.8	90.1	123.2	167.8	210.4	217.4	173.4	1289.4
Actul Evapotranspiration Torent-Whit method	0.9	4.9	11.5	8.0	12.6	25.4	30.8	10.4	0.4	0.2	0.9	0.1	106.1

Table 23: Actual and potential evapotranspiration in Mehrabad Ramjerd station

Mont Method	Oct	Nov	Dec	Janu	Febr	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Hargreaves-Samani	127.8	85.7	53.7	38.0	38.6	59.9	103.2	141.3	193.8	229.1	236.2	202.3	1509.7
Evaporation Pan	137.5	86.9	56.2	42.8	61.4	71.2	100.8	147.5	212.2	251.2	237.9	197.0	1602.7
Shiraz University(1)	123.6	80.3	74.8	52.6	53.7	84.0	151.6	170.1	192.6	202.9	228.0	206.3	1620.6
Shiraz University(2)	117.0	76.2	48.9	35.5	36.7	55.6	98.5	137.2	187.7	230.8	243.3	196.2	1469.4
Actul Evapotranspiration Torent-Whit method	1.5	8.2	16.1	19.3	22.7	31.7	33.7	13.3	13.3	0.6	0.3	0.1	147.7

Table 24: Hydrometric station

Column	Main river	River	Station	Geographic information			Foundation year	Area (km ²)	Equipment		
				Longitude	Latitude	Height			Eshel	Limnograph	Teleferic
1	Kor	Nahr Ramjerd	Ahmadabad(Nahr Ramjerd)	52-31-00	30-09-00	1610	1948	4629.8	+	-	-
2	Kor	Nahrson	Ahmadabad(Nahr Rason)	52-28-00	30-09-00	1613	1948	239.7	+	-	-
3	Khoshk	Khoshk	Eghbalabad	52-40-42	29-33-39	1460	1998	948.6	+	+	+
4	Tashk lake	Tashk lake	Abade tashk	53-45-00	29-50-00	1650	1976	74.0	+	-	-
5	Kor	Tane shol	Badamak	52-15-00	30-15-00	1750	1971	193.6	+	-	+
6	Kor	Gavgodar	Bande bahram	52-11-00	30-41-00	2110	1996	1425.4	+	-	+
7	Kor	Maïen	Bidkal	52-37-31	30-09-57	1600	1972	464.7	+	-	+
8	Khoshk	Khoshk	Polebaghsafa	52-32-00	29-38-00	1520	1966	833	+	-	-
9	Kor	Kor	Polekhan	52-46-10	29-51-01	1590	1964	14507.8	+	+	+
10	Kor	Sivand	Polekhan	52-47-00	29-52-00	1323	1972	6618.2	+	-	+
11	Baba Haji	Baba Haji	Polefasa	52-38-13	29-29-03	1476	1970	721.0	+	-	+
12	Tashk lake	Tashk lake	Tombsholi	53-34-00	29-47-00	1650	1984	Lake	+	-	-
13	Kor	Sivand	Tangebola ghi	53-09-11	30-10-02	1820	1984	4797.8	+	+	+
14	Kor	Kor	Tangebora gh	52-03-00	30-38-00	1900	1967	2274.4	+	+	+
15	Kor	Dozkord	Tangebora gh	52-02-00	30-38-00	1900	1967	257.8	+	-	-
16	Kor	Shorshiri	Jamalbeig	51-	30-	1897	1967	542.7	+	-	+

		n		58-00	35-00						
17	Kor	Shor Kharestan	Jamalbeig	51-58-02	30-35-48	1900	1970	160.6	+	+	+
18	Kor	Shirin	Jamalbeig	51-58-22	30-35-00	1880	1967	370.5	+	+	+
19	Kor	Kor	Jahanabad kherameh	53-23-00	29-33-00	1530	1966	18122	+	-	-
20	Kor	Kor	Jonaki	52-38-00	30-07-00	1610	1988	5637.2	+	-	+
21	Kor	Sivand	Chambaian	53-13-00	30-25-00	2050	1972	2039.6	+	+	+
22	Kor	Kor	Chamriz	52-06-03	30-28-00	1840	1963	3362.4	+	+	+
23	Rahdar	Rahdar	Chenar Rahdar	52-25-29	29-37-05	1637	1349	173.8	+	-	-
Column	Main river	River	Station	Geografic information			Foundati on year	Area (km2)	Equipment		
				Longi tude	Latit ude	Heig ht			Esh el	Limino graph	Teleferic
27	Kor	Kor	Hassana bad Fars	53-20-09	29-34-29	1600	1996	16387.9	+	-	+
28	Kor	Garejiv eh spring	Hosseina bad	52-17-00	29-58-00	1680	1971	Sprin g	+	-	-
29	Kor	Sarab spring	Hosseina bad	52-17-00	29-58-00	1680	1971	Sprin g	+	-	-
30	Kor	Kor	Khanmin	52-15-00	30-20-00	1690	1969	3775	+	+	+
31	Bakhtegan lake	Left drainag e	Kherame h	53-14-00	29-39-00	1560	1986	Drain age	+	-	-
32	Bakhtegan lake	Raight drainag e	Kherame h	53-18-00	29-34-00	1564	1986	Drain age	+	-	-
33	Kor	Kor	Khosros hirin	52-00-00	30-54-00	2280	1971	22.8	+	-	-
34	Kor	Kor	Kheiraba d	53-06-00	29-38-00	1572	1987	1650	+	-	+
35	Kor	Sivand	Dashtbal	52-58-47	30-00-30	1660	1959	5988.7	+	+	+
36	Sivand	Dehbid	Dehbid	53-12-00	30-37-00	2300	1971	341.2	+	-	-

37	Tangeboragh	Sefid	Dehkade Sefid	52-07-00	30-39-00	2100	1970	619.6	+	+	+
38	Tangeboragh	Gavgo dar	Dehkade Sefid	52-07-00	30-38-00	2100	1970	1561.6	+	+	+
39	Maharl u lake	Maharl u lake	Dobaneh	52-49-00	29-21-00	1470	1976	Lake	+	-	-
40	Sivand	Simakan	Didgan	53-19-00	30-17-00	2060	1971	278.2	+	-	-
41	Kor	Sivand	Rahmata bad	53-03-36	30-06-01	1761	1989	4953.6	+	+	+
42	Ahochar Drainage	Ahoch ar Drainage	Zarghan	52-44-00	29-44-00	1570	1984	Drain age	+	-	-
43	Kor	Kor	Drodzan dam	52-25-54	30-12-14	1646	1967	4565.4	+	+	-
44	Gavgodar(Ab balangan)	Ghadm gah Spring	Sadeh1	52-10-35	30-43-26	2188	1972	Sprin g	+	-	-
45	Gavgodar(Ab balangan)	Ghadm gah Spring	Sadeh 2	52-10-35	30-43-26	2188	1972	Sprin g	+	-	-
46	Gavgodar(Ab balangan)	Ghadm gah Spring	Sadeh 3	52-10-35	30-43-26	2188	1972	Sprin g	+	-	-
47	Gavgodar(Ab balangan)	Ghadm gah Spring	Sadeh 4	52-10-35	30-43-26	2188	1972	Sprin g	+	-	-
48	Bakhtegan Lake	Bakhte gan Lake	Sahlabad	54-00-00	29-15-00	1550	1984	Lake	+	-	-
49	Kor	Saraite n	Shadkam	52-19-00	30-57-00	2340	1974	886.3	+	-	-
50	Kor	Chaho	Shahrak	52-29-00	30-11-30	1615	1974	242	+	-	-
51	Kor	Maien	Zargham abad	52-38-00	30-10-00	1610	1951	512.6	+	-	-
52	Kor	Kor	Abasaba d	52-12-30	30-15-00	1700	1983	181.6	+	+	+
53	Paskohak	Paskoh ak	Aliabad	52-18-00	29-44-00	2013	1987	30.1	+	-	-

closed stations

Table 25: Annual discharge in hydrometric stations

Year	Chamriz	Aliabad-khoshk	Sefid	Drozdand	Right Drainage	Left Drainage	Rahmat abad	Dashtbar	Khosroshir
1970-71	9.33	0.25	2.23	4.44	0.70	1.23	2.00	0.60	1.69
1971-72	32.00	0.70	5.46	9.59	2.30	2.29	3.28	4.41	2.47
1972-73	17.59	0.53	3.41	14.69	3.61	3.29	4.55	2.93	1.98
1973-74	24.53	0.43	4.40	11.95	2.94	2.74	3.87	2.11	2.22
1974-75	31.01	0.44	6.07	20.51	4.18	3.78	5.22	2.24	2.44
1975-76	44.06	0.59	6.33	42.86	5.70	5.91	8.01	3.46	2.89
1976-77	19.73	0.39	4.20	14.61	3.59	3.25	4.35	1.83	2.05
1977-78	77.73	1.27	7.20	38.64	5.89	7.81	10.50	9.10	2.91
1978-79	24.63	0.97	4.70	18.46	4.38	3.98	5.49	6.65	2.22
1979-80	43.11	1.34	7.97	30.63	5.83	6.29	8.51	9.68	2.86
1980-81	28.06	0.78	4.65	19.75	4.62	4.22	5.81	5.06	2.34
1981-82	30.08	0.66	5.03	16.69	4.04	3.64	5.05	4.05	2.41
1982-83	21.31	0.49	4.22	13.23	3.64	3.29	4.59	2.63	2.11
1983-84	13.46	0.35	2.73	6.02	1.99	2.09	3.02	1.44	1.84
1984-85	15.84	0.38	2.41	7.20	1.90	2.03	2.94	1.69	1.92
1985-86	17.81	0.26	2.62	4.87	1.51	1.78	2.62	0.69	1.99
1986-87	32.75	0.83	5.19	19.91	4.50	4.09	5.64	5.45	2.50
1987-88	27.66	0.38	4.68	19.77	3.20	4.14	5.70	1.75	2.32
1988-89	16.80	0.29	2.97	10.47	2.76	2.93	3.80	1.01	1.95
1989-90	28.17	0.35	3.70	11.46	4.09	4.90	4.79	1.50	2.34
1990-91	23.97	0.40	3.53	12.20	4.16	3.54	4.42	1.89	2.20
1991-92	48.25	0.52	7.78	24.75	6.03	5.31	3.25	2.88	3.03
1992-93	58.96	1.61	9.30	47.84	4.28	9.41	12.21	11.98	3.40
1993-94	17.82	0.63	3.52	9.72	2.98	2.29	4.16	3.82	1.99
1994-95	42.34	1.33	5.14	21.41	5.72	6.07	9.46	9.64	2.83
1995-96	38.80	1.35	5.32	22.84	5.38	5.24	8.50	9.82	2.71
1996-97	15.97	0.68	3.18	9.93	2.40	2.36	4.75	4.18	1.952
1997-98	37.17	0.84	6.44	12.42	5.41	5.30	6.22	5.51	2.39
1998-99	23.53	0.96	4.26	11.24	3.95	3.56	7.06	6.54	2.67
1999-	10.49	0.43	2.68	3.23	1.50	1.78	3.55	2.17	1.90

2000									
2000-1	9.03	0.29	2.38	5.08	0.63	1.27	1.98	0.94	1.52
2001-2	41.00	0.92	7.50	23.35	5.37	5.23	6.30	6.22	2.23
2002-3	26.85	0.92	4.43	13.67	2.68	2.55	3.39	2.52	2.30
2003-4	41.82	1.37	6.96	27.46	5.25	5.04	5.36	5.79	2.59
2004-5	31.47	1.53	6.65	28.28	5.57	5.60	11.61	11.84	2.78
2005-6	26.39	0.46	5.83	21.32	3.02	2.80	4.63	4.32	2.74
2006-7	28.38	0.42	8.45	24.245	3.72	3.36	5.94	5.04	2.60
2007-8	19.28	0.06	3.45	14.422	1.58	1.83	2.41	1.15	2.50
2008-9	7.16	0.04	1.60	3.098	0.00	0.22	1.41	0.27	1.59
2009-10	8.49	0.11	1.88	4.295	0.00	0.08	0.99	0.30	1.17
2010-11	8.49	0.36	2.69	5.994	0.00	0.21	0.55	0.00	1.52
2011-12	19.74	0.15	3.12	9.787	0.60	2.16	0.73	0.46	1.78
2012-13	16.09	0.37	2.75	6.850	1.05	1.92	0.83	0.49	1.78
Annual Average	26.14	0.64	4.63	16.26	3.32	3.51	4.88	3.86	2.27

Year	Hassanabad	Chenarsokhte-Aeezam	Chenarsokhte-Khoshk	Chenarrahdar	Jamalbeig Shirin	Jamalbeig Khorestan	Polfasa	Polekhan
1970-71	0.761	0.83	2.21	0.19	3.06	0.41	1.08	8.62
1971-72	12.727	1.16	4.58	0.40	13.75	1.94	1.75	18.48
1972-73	5.435	1.40	0.56	0.60	5.99	0.96	2.28	28.25
1973-74	9.085	1.27	0.37	0.49	8.16	1.43	2.01	23.01
1974-75	12.110	1.00	0.32	0.51	9.72	1.85	1.36	33.43
1975-76	20.442	1.15	1.10	0.59	14.71	3.18	1.58	54.91
1976-77	3.842	1.33	0.12	0.41	6.83	0.77	1.05	28.09
1977-78	20.364	1.30	0.79	1.54	5.93	3.16	1.90	74.06
1978-79	10.096	1.21	0.57	0.4	1.61	1.57	0.95	35.45
1979-80	10.949	1.59	0.79	0.62	14.37	1.68	0.83	58.75
1980-81	9.641	1.96	0.72	0.22	8.95	1.51	1.05	37.93
1981-82	8.935	1.48	0.19	0.21	11.68	1.41	0.73	32.06

1982-83	7.453	1.28	0.57	0.36	6.88	1.22	2.30	28.51
1983-84	1.665	1.06	0.18	0.28	3.04	0.51	1.63	16.43
1984-85	6.722	1.02	0.58	0.17	5.18	1.13	1.59	15.85
1985-86	5.289	0.94	0.31	0.16	6.41	0.95	1.43	13.35
1986-87	14.014	2.14	0.87	0.77	10.20	2.12	2.69	36.63
1987-88	13.041	1.72	1.34	0.99	5.55	1.98	1.79	37.12
1988-89	5.635	1.77	0.60	1.12	6.80	0.99	0.81	22.49
1989-90	14.300	1.64	0.90	0.64	8.54	2.17	3.11	30.10
1990-91	11.501	1.80	0.55	0.58	11.18	1.76	2.78	27.22
1991-92	24.226	1.67	1.29	0.96	19.02	3.92	2.98	47.50
1992-93	19.704	2.36	4.48	1.77	3.12	3.04	6.30	96.63
1993-94	0.000	1.91	0.14	0.27	3.12	0.31	2.03	23.25
1994-95	19.941	2.29	1.71	1.77	11.51	3.09	3.23	55.46
1995-96	16.134	2.25	2.00	1.61	9.65	2.45	3.81	48.22
1996-97	2.858	1.17	0.15	0.53	4.42	0.65	2.55	19.13
1997-98	19.9	2.08	1.79	1.17	13.79	3.87	3.59	48.82
1998-99	14.06	2.10	1.25	0.99	7.99	1.88	2.83	31.28
1999-2000	4.18	1.00	3.34	0.19	3.95	0.49	1.03	13.32
2000-1	0.43	1.00	2.11	0.10	3.88	0.47	1.07	8.20
2001-2	27.81	1.49	1.30	0.76	34.58	11.00	8.27	48.13
2002-3	7.09	1.63	0.30	0.40	7.05	1.56	1.57	21.10
2003-4	22.03	1.58	1.23	0.76	10.52	2.74	2.09	46.19
2004-5	21.06	2.04	1.44	1.09	8.44	2.03	3.72	51.78
2005-6	21.32	1.89	0.39	0.68	7.05	1.56	2.15	23.60
2006-7	14.18	1.55	0.60	0.44	8.49	2.05	1.68	29.24
2007-8	2.14	0.96	0.03	0.10	3.32	0.27	0.63	13.82
2008-9	0.00	0.53	0.53	0.05	3.55	0.35	0.74	1.64
2009-10	0.00	0.41	1.26	0.09	4.18	0.57	0.48	4.70
2010-11	0.00	0.64	1.54	0.15	6.88	1.50	0.71	5.86
2011-12	1.54	0.49	2.67	0.60	7.06	1.56	1.90	10.52
2012-13	4.19	0.63	3.18	0.39	5.76	1.11	2.07	12.65
Annual Avearage	10.39	1.41	1.18	0.61	8.27	1.84	2.10	30.74

Year	Bidkal	Eghbalabad	Tangebologhi	Gavgodar	Chambaian	Ahmadabad (Nahr Ramjerd)	Badamak	Polebaghsafa	Jahanabad Kherameh
1970-71	1.048	0.784	0.91	3.01	1.10	9.00	7.58	0.48	1.89
1971-72	2.273	1.670	3.45	7.85	1.63	8.89	27.82	2.24	10.91
1972-73	3.498	1.327	2.47	4.77	1.43	24.17	14.95	1.56	14.55
1973-74	2.839	1.136	1.92	6.25	1.31	17.61	21.15	1.18	11.72
1974-75	4.479	1.166	2.01	7.89	1.27	23.68	26.93	0.59	20.04
1975-76	4.293	1.449	2.82	8.93	1.39	31.35	3.042	1.169	36.21
1976-77	2.351	1.071	1.73	6.13	1.14	19.78	0.99	0.42	18.98
1977-78	1.371	2.764	6.59	10.51	2.28	40.98	39.18	4.41	48.23
1978-79	4.406	2.193	4.95	6.57	1.51	20.88	1.53	3.28	29.49
1979-80	9.021	2.898	6.98	9.11	2.37	36.12	2.31	4.68	35.74
1980-81	4.792	1.823	3.89	7.03	2.13	19.48	1.54	2.54	25.35
1981-82	3.473	1.587	3.21	6.90	1.92	15.41	1.63	2.07	16.55
1982-83	3.108	1.255	2.26	5.57	1.52	16.27	1.27	1.35	13.56
1983-84	1.543	0.978	1.47	3.86	1.21	6.22	0.48	0.69	2.83
1984-85	2.583	1.938	1.64	4.02	1.10	6.79	1.35	0.75	7.16
1985-86	1.633	0.805	0.73	4.25	1.12	5.15	1.01	1.24	5.35
1986-87	4.555	1.912	4.15	7.60	1.77	19.19	1.51	2.72	22.24
1987-88	4.616	1.051	2.03	8.06	1.26	21.50	1.51	2.11	22.59
1988-89	2.774	0.878	1.53	4.76	1.16	13.40	0.67	1.04	11.98
1989-90	3.731	0.993	1.41	8.13	1.23	17.62	2.46	1.48	17.50
1990-91	3.368	1.083	1.33	6.14	1.28	16.02	1.20	1.67	15.41
1991-92	5.931	1.314	2.26	9.60	1.42	23.54	3.48	1.58	30.12
1992-93	12.205	3.433	9.07	16.52	2.68	54.46	51.90	6.77	65.76
1993-94	2.870	1.534	3.39	5.23	1.55	13.82	0.36	1.35	12.53
1994-95	6.943	2.888	7.10	10.66	2.35	31.66	37.05	4.41	35.90
1995-96	6.023	2.931	5.55	7.78	2.38	27.65	33.89	4.71	30.64
1996-97	2.354	1.616	3.52	4.42	1.60	11.54	0.25	1.50	9.54
1997-98	13.942	1.928	4.74	8.95	1.78	27.98	4.52	3.20	31.08
1998-99	2.380	2.167	4.64	6.04	1.93	18.27	1.07	2.24	18.35
1999-2000	0.483	1.16	2.32	3.25	1.32	8.32	8.61	1.20	5.33

2000-1	0.629	0.71	1.25	2.94	1.15	5.49	7.31	0.63	1.61
2001-2	64.217	2.12	5.49	9.77	1.88	27.60	35.85	3.07	30.58
2002-3	3.005	1.99	2.09	6.75	1.37	12.63	23.22	1.36	10.97
2003-4	6.847	2.23	3.71	9.94	1.82	26.53	36.59	2.88	29.17
2004-5	6.551	3.18	8.47	7.73	2.66	29.62	27.34	5.67	33.22
2005-6	5.670	1.88	3.50	6.65	1.62	14.02	22.81	2.20	12.78
2006-7	6.319	1.53	3.87	7.07	1.72	17.14	24.58	2.53	16.88
2007-8	0.409	0.70	2.62	5.13	1.18	8.60	16.46	0.73	5.69
2008-9	0.210	0.39	0.99	2.54	1.06	1.86	5.64	0.33	5.77
2009-10	0.803	0.46	0.40	2.83	1.06	3.55	6.82	0.34	5.87
2010-11	0.990	0.43	0.02	2.83	1.02	4.19	6.82	0.20	4.71
2011-12	2.635	0.88	0.05	5.23	1.08	6.77	16.87	0.41	3.29
2012-13	1.530	1.03	0.27	4.45	1.09	7.95	13.62	0.43	4.84
Annual Aaverage	5.23	1.54	3.09	6.60	1.55	17.97	12.68	1.99	18.44

■ constructed data

Table 26: Statistical characteristics in representative stations

Column	River-Station	Area(Km ²)	Duration	Q					
				Min Q (m3/sec)	Max Q (m3/sec)	Average Q (m3/sec)	St	g	Cv
1	Babahaji-Polefasa	721	Index	0.48	8.27	2.10	1.47	2.33	2.17
			34	0.48	8.27	2.16	1.64	2.08	2.68
2	Koshk-Chenarsojhate	146.8	Index	0.03	4.58	1.18	1.10	1.64	1.21
			37	0.12	4.48	0.94	0.93	2.57	0.87
3	Sefid-Dehkadesefid	619.6	Index	1.60	9.31	4.63	1.94	0.57	3.77
			36	1.60	9.3	4.54	1.82	0.42	3.33
4	Sivand-tangebologhi	4797.8	Index	0.02	9.07	3.09	2.22	0.95	4.91
			27	0.02	9.07	3.05	2.47	0.96	6.09
5	Sivand-Dashtbal	5988.7	Index	0	11.98	3.86	3.25	1.03	10.56
			54	0	11.98	3.18	3.15	1.24	9.90
6	Shorkharestan-Jamalbeig	160.9	Index	0.27	11	1.84	1.72	3.78	2.95
			39	0.27	11	1.9	1.78	3.66	3.17
7	Shirin-Jamalbeig	270.5	Index	1.61	34.57	8.26	5.58	2.71	31.19
			37	1.61	19.02	7.405	4.16	1.11	17.31
8	Kor-Polekhan	14507.8	Index	1.64	96.63	29.96	19.21	1.14	368.86
			48	1.64	96.63	30.74	19.58	1.10	383.23
9	Kor-Chamriz	3362.4	Index	7.164	58.96	26.14	12.38	0.51	152.23
			48	7.164	58.96	25.14	12.26	0.61	150.32
10	Kor-Drodzandam	4565.4	Index	3.1	47.84	16.26	10.48	1.16	109.79
			29	3.1	47.84	14.72	9.798	1.36	95.99
11	Gavgodar-Dehkadesefid	1561.6	Index	2.55	16.52	6.60	2.74	1.04	7.51
			31	2.54	16.52	7.51	2.83	1.47	7.99
12	Nahrazam-Chenarsokhte	473.4	Index	0.41	2.36	1.41	0.52	-0.51	0.27
			38	0.41	2.36	1.46	0.54	-0.25	0.29
13	Kor-Hassan abad kherameh	16387.9	Index	0	27.81	10.39	7.83	0.37	61.25
			16	0	27.81	9.99	9.82	0.48	96.36

Table 27: Used relationship to construct data

Column	Reference Station	Made Station	Correlation Coefficient			Realationship
			R	A	B	
1	Dashtbal	Tange bolaghi	0.95	0.67	0.51	$Y=0.6683X+0.5078$
2	Polekhan	Rahmatabad	0.77	0.13	0.88	$Y=0.1299X+0.8825$
3	Polekhan	Chambaian	0.69	0.14	1.02	$Y=0.1383X+1.0206$
4	Chamriz	Dehkade Sefid(Gavgodar)	0.87	0.21	1.02	$Y=0.2135X+1.0153$
5	Chamriz	Dehkade Sefid(Sefid)	0.76	0.14	0.90	$Y=0.1425X+0.9029$
6	Chamriz	Jamalbeig(Kharestan)	0.77	0.06	-0.22	$Y=0.0647X-0.2218$
7	Chamriz	Khosro-shirin	0.62	0.03	1.37	$Y=0.0344X+1.3726$
8	Polekhan	Chenar rahdar	0.67	0.02	0.02	$Y=0.0206X+0.0173$
9	Dashtbal	Eghbal abad	0.87	0.23	0.64	$Y=0.2329X+0.6437$
10	Polekhan	Chenarsokhte	0.64	0.32	0.44	$Y=0.3199X^{0.4408}$
11	Jamal beig(khorestan)	Hassan abad	0.71	-0.58	-2.89	$Y=-0.5836X-2.8895$
12	Dashtbal	Aliabad khoshk	0.71	0.12	0.17	$Y=0.1202X+0.1739$
13	Polekhan	Right drainage kherameh	0.92	0.20	-0.94	$Y=0.2034X-0.9419$
14	Polekhan	Left drainage kherameh	0.94	0.10	0.46	$Y=0.0992+0.4602$
15	Polekhan	Pole fasa	0.65	0.28	0.63	$Y=0.2798X^{0.6285}$
16	Dashtbal	Chenarsokhte khosk	0.63	0.18	0.10	$Y=0.1827+0.1032$
17	Polekhan	Ahmadabad(Nahrarmjerd)	0.88	0.55	0.95	$Y=0.5538+0.9453$
18	Chamriz	Badamak	0.71	0.89	-0.76	$Y=0.893X-0.7573$
19	Dashtbal	Pole bagh safa	0.86	0.46	0.20	$Y=0.4623+0.201$
20	Polekhan	Chenarsokhte	0.62	0.04	-0.49	$Y=0.0372X-0.488$
21	Chamriz	Jamalbeig(shirin)	0.68	0.36	-1.15	$Y=0.36X-1.1514$

Table 28: Justin coefficient and runoff in Kor river basin

River-Station	Area (km ²)	Rainfall (cm)	Temperature (°C)	Elevation(km)		Slope	Flooded Discharge (m ³ /sec)	R(cm)	Justin Coefficient(k)
				Min	Max				
Tange bostanak-Menjan	203	52.7	14.0	1.79	3.61	0.13	0.49	4.61	0.131
Tangeshol-Badamak	194	48.1	16.7	1.73	3.46	0.12	0.86	6.71	0.248
Sefid-Dehkade sefid	620	50.5	14.0	2.08	3.09	0.04	0.94	6.80	0.251
Shorkharestan-Jamalbeig	161	80.6	11.2	1.93	3.01	0.09	0.82	28.92	0.340
Shirin-Jamalbeig	371	52.4	11.7	1.91	3.71	0.09	2.86	13.58	0.379
Kor-Chamriz	3362	50.3	12.4	1.79	3.71	0.03	8.13	8.41	0.306
Kor-Khosroshirin	23	40.4	10.0	2.32	3.01	0.14	0.13	9.28	0.383
Gavgodar-Dehkadesefid	1562	47.8	14.3	2.08	3.53	0.04	1.65	2.78	0.117

Table 29: Justin coefficient and runoff in Sivand river basin

River-Station	Area (km ²)	Rainfall (cm)	Temperature (°C)	Elevation(km)		Slope	Flooded Discharge (m ³ /sec)	R(cm)	Justin Coefficient(k)
				Min	Max				
Sivand-Tangebolaghi	4798	34.0	10.7	1.83	3.94	0.03	1.39	0.71	0.054
Sivand-Dashtbal	5989	36.5	17.6	1.65	3.94	0.03	2.37	0.85	0.070
Sivand-Rahmatabad	4954	35.1	12.7	1.76	3.94	0.03	2.05	0.92	0.070

Table 30: Justin coefficient and runoff in Khoshk river basin

River-Station	Area (km ²)	Rainfall (cm)	Temperature (°C)	Elevation(km)		Slope	Flooded Discharge (m ³ /sec)	R(cm)	Justin Coefficient(k)
				Min	Max				
Babahaji-Polfasa	721	36.7	19.0	1.47	2.94	0.06	1.12	2.37	0.183
Koshk-Chenarsokhte	147	44.4	14.0	1.68	2.96	0.11	0.82	8.86	0.365
Rahdar-Chenarrahdar	174	37.3	17.0	1.62	2.94	0.10	0.45	4.26	0.274

Table 31: Justin coefficient and runoff in basin without data

Column	Basin without data	Area (km ²)	Rainfall (cm)	Temperature (c)	Elevation(km)		Slope	Justine methode		Realation between Rainfall-area	
					Min	Max		Flooded Discharge (m ³ /sec)	R(cm)	Flooded Discharge (m ³ /sec)	R(cm)
1	Bandbahrām-Gavgodar	1425.4	40.3	14.8	2.10	3.53	0.04	3.12	1.08	3.53	7.81
2	Ahmadabad-Ojan	273.9	37.2	16.6	2.20	3.34	0.07	0.63	0.96	0.55	6.29
3	Polesaraiten-saraiten	644.8	26.8	14.9	2.38	3.26	0.03	0.70	0.47	0.57	2.81
4	Input kaftar-kaftar lake	2552.9	28.6	11.8	2.31	3.53	0.02	2.59	2.18	2.57	3.17
5	Sarvestan-Nazarabad	1076	24.1	17.5	1.48	2.80	0.04	1.39	1.55	1.36	3.98
6	Sarvestan basin	1641	26.4	19.5	1.48	2.80	0.03	2.08	1.69	2.07	3.99
7	West kavar basin	323	39.7	19.5	1.50	2.60	0.06	0.75	4.23	0.75	7.28
8	Estahban-Main river	530	27.5	17.6	1.59	2.80	0.05	0.49	2.48	0.45	2.69
9	Neyriz-Main river	322	22.5	20.9	1.59	2.60	0.06	0.18	1.63	0.15	1.45
10	Neyriz basin	1019	20.2	12.4	1.59	2.60	0.03	0.53	1.58	0.53	1.64
11	Abadetashk-Main river	420	24.0	18.5	1.59	2.50	0.04	0.30	2.01	0.27	2.02
12	Abadetashk basin	1478	24.6	18.6	1.59	3.10	0.04	1.03	2.34	1.06	2.28
13	Arsanjan-Main river	482	31.2	17.3	1.60	3.10	0.07	0.71	3.97	0.61	3.98
14	Arsanjan basin	879	31.2	16.1	1.60	3.10	0.05	1.26	3.47	1.19	4.28
15	Sarpaniran basin	446	35.4	11.5	1.80	2.50	0.03	0.52	3.55	0.50	3.56
16	Tvabee arsanjan	275	30.5	14.3	1.59	2.30	0.04	0.33	2.76	0.31	3.53
17	Tangehana-Pichakan	2079	20.6	20.9	1.59	2.90	0.03	1.21	1.23	1.51	2.29
18	Seidan farough	369	36.4	17.6	1.60	2.80	0.06	0.66	3.42	0.56	4.82

19	Namdan	2803	50.6	10.7	2.30	3.20	0.02	2.70	6.71	2.85	3.20
20	Kheir	229	22.1	20.2	1.60	2.60	0.07	0.20	1.60	0.16	2.26
21	Khanekhat	383	18.6	19.6	1.60	2.80	0.06	0.45	1.17	0.41	3.34
22	Abadetashk-Pichakan	1937	24.5	18.3	1.59	3.10	0.03	1.17	1.86	1.41	2.29
23	South tashk lake	163	16.4	18.9	1.59	2.20	0.05	0.14	0.82	0.12	2.38
24	Goshnegan	426	33.1	19.5	1.47	2.40	0.05	0.46	2.80	0.51	3.77
25	Estahban-Main river	418	35.5	19.4	1.69	2.80	0.05	0.41	3.54	0.37	2.82
26	Beiza-Zarghan	1738	41.6	15.3	1.60	2.80	0.03	3.38	1.09	4.25	7.71
27	Darian	334	35.2	13.9	1.60	4.20	0.04	0.62	0.87	0.62	5.82
28	Bakan closed area	334	46.9	14.3	2.30	3.10	0.04	1.32	5.92	1.19	10.93

Table 32: Average discharge and flow coefficient in hydrometric stations and all sub basins

Column	River-Station	Area (Km ²)	Annual Discharge (m ³ /Sec)	Speceific Discharge (lit/s/Km ²)	Rainfall (mm)	Flow Coefficient %
1	Kor-Jahanabad	16672	19	1	420	0
2	Kor-Hassanaba	16388	10	1	380	0
3	Kor-Polekhan	14508	31	2	391	0
4	Sivand-Polekhan	6618	3	0	360	0
5	Sivand-Emadabad	6585	4	1	340	0
6	Sivand-Dashtbal	5989	4	1	360	0
7	Sivand-Rahmatabad	4954	5	1	420	0
8	Sivand-Tangebolaghi	4798	3	1	420	0
9	Galedar-Ghaderabad	562	0	0	220	0
10	Simakan-Didegan	278	0	1	212	0
11	Dehbid-Dehbid	341	0	0	210	0
12	Kor-Jonaki	5638	20	3	480	0
13	Maien-Zarghamabad	513	2	4	370	0
14	Maien-Bidkal	465	5	11	410	0
15	Kor-Ahmadabad	4630	18	4	430	0

16	Kor-Drodzandam	4565	16	4	430	0
17	Tangeshol-Badamak	194	1	7	520	0
18	TangeBostanak-Menjan	203	1	6	580	0
19	Kor-Chamriz	3362	26	8	412	0
20	Shorshirin-Jamalbeig	543	8	14	520	0
21	Shirin-Jamalbeig	370.5	7.86	21.21	664	0
22	Margan-Margan	118.7	1.36	11.46	580	0
23	Chobkhale-Chobkhale	157.5	3.25	20.63	610	0
24	Shorkharestan-Jamalbeig	160.6	1.84	11.46	500	0
25	Dozkord-Tangeboragh	257.8	2.86	11.09	540	0
26	Kor-Tangeboragh	2274.4	12.01	5.28	439	0
27	Sefid-Dehkadesefid	619.6	4.63	7.47	480	0
28	Gavgadar- Dehkadesefid	1561.6	6.6	4.23	470	0
29	Abadetashk-Abadetashk	95.9	0.22	2.29	340	0
30	Khoshk-Eghbalabad	948.6	1.54	1.62	340	0
31	Naharazam-Chenarsokhte	473.4	1.41	2.98	365	0
32	Khoshk-Chenarsokhte	146.8	1.18	8.04	380	0
33	Khoshk-Aliabad	72	0.64	8.89	370	0
34	Saraitin-Shadkam	886.3	0.9	1.02	300	0
35	Maron-Aliabad	40.6	0.22	5.42	510	0
36	Paskohak-Aliabad	30.1	0.26	8.64	480	0
37	Gazdan-Maroon	31.8	0.09	2.83	490	0
38	Daremaron- Daremaron	31.8	0.08	2.52	480	0
39	Rahdar-Chenarrahdar	173.8	0.61	3.51	342	0
40	Babahaji-Polefasa	721	2.1	2.91	320	0
41	Kor-Khosroshirin	23	2	88	400	0
42	Sivand-Chambaian	2040	2	1	260	0
43	Khoshk-Baghsafa	761	2	3	470	0
44	Kor-Khanmin	3778	21	6	450	0
45	Kor-Kheirabad	15337	24	2	400	0
46	Nahrson-Ahmadabad	240	2	9	450	0
47	Kor-TangeChaho	234	1	4	460	0
48	Mainbashi- Mainbashi	30	0	7	450	0
49	Kor-Input Dradzandam	4103	33	8	470	0
50	Gavgodar-Bandebahram	1425	4	2	441	0

51	Ojan-Ahmadabad	274	0	2	380	0
52	Araitien-Polesaraitin	645	1	1	210	0
53	Kaftar lake-Input Kaftar	2553	2	1	242	0
54	Nazarabd-Output Sarvestan	1076	1	1	310	0
55	Sarvestan basin-Output basin	1641	2	1	320	0
56	West kavar basin-Output basin	323	1	2	460	0
57	Estahban basin-Output basin	530	0	0	280	0
58	Main river Neyriz-Output basin	322	0	0	201	0
59	Neyriz basin- Output basin	1019	0	0	210	0
60	Abadetashk main river-Output basin	420	0	0	185	0
61	Abadetashk basin-Output basin	1478	1	1	220	0
62	Arsanjan main river-Output basin	482	0	1	340	0
63	Arsanjan basin-Output basin	879	1	1	320	0
64	Sarpaniran basin-Output basin	446	0	1	290	0
65	Tavabee Arsanjan-Output area	275	0	1	300	0
66	Tangehana,Pichakan-Output area	2079	1	1	210	0
67	Seydan Farough-Output area	369	0	1	370	0
68	Namdan-Output area	2803	2	1	230	0
69	Khir-Output area	229	0	1	220	0
70	Khanekat-Output area	383	0	1	300	0
71	Abadetashk,Jahanabad-Output area	1937	1	1	210	0
72	South tashk lake- Output area	163	0	1	265	0
73	Goshnegan-Output area	426	0	1	300	0
74	Estahban-Output area	418	0	1	280	0
75	Beiza Zarghan-Output area	1738	4	2	400	0
76	Darian-Output area	334	0	1	380	0
77	Bakan Closed basin- Output basin	344	1	3	410	0

Table 33: Average annual discharge with different return period

Column	River-Station	Statistic Parameters				Average annual discharge with different T(m ³ /s)						
		X	S _{n-1}	g	2	3	5	10	25	50	100	200
1	Babahaji-Polefasa	2.10	1.47	2.33	1.71	2.30	3.04	4.10	5.65	6.95	8.37	9.93
2	Koshk-Chenarsojhate	1.18	1.10	1.64	0.55	0.80	1.14	1.67	2.50	3.24	4.10	5.08
3	Sefid-Dehkadesefid	4.63	1.94	0.57	4.38	6.30	6.16	7.04	7.96	8.53	9.03	9.48
4	Sivand-tangebolaghi	3.09	2.22	0.95	3.14	3.65	4.80	5.86	7.11	8.14	8.95	9.13
5	Sivand-Dashtbal	3.86	3.25	1.03	3.04	4.15	5.57	7.65	10.72	13.34	16.23	19.42
6	Shorkharestan-Jamalbeig	1.84	1.72	3.87	1.42	2.01	2.79	3.94	5.67	7.16	8.83	10.69
7	Shirin-Jamalbeig	8.26	5.58	2.70	5.70	7.14	8.85	11.13	14.23	16.67	19.22	21.90
8	Kor-Polekhan	30.74	19.58	1.10	27.13	35.59	45.16	57.24	72.35	83.42	94.30	105.60
9	Kor-Chamriz	26.14	12.37	0.51	25.50	30.94	36.12	41.68	47.61	51.44	54.88	58.03
10	Kor-Drodzandam	16.26	10.47	1.16	12.32	16.74	22.13	29.46	39.40	47.16	55.14	63.36
11	Gavgodar-Dehkadesefid	6.60	2.74	1.04	7.03	8.22	9.55	11.21	13.30	14.85	16.40	17.96
12	Nahrazam-Chenarsokhte	1.41	0.52	-0.04	1.51	1.76	1.99	2.20	2.38	2.47	2.53	2.57

Table 34: Average annual discharge with different return period in wettest and driest year

Column	Return Period	Return Period							Average	Dry year						
	River-Station	3	5	10	25	50	100	200	2	3	5	10	25	59	100	200
1	Babahaji-Polefasa	3.96	4.85	5.12	6.04	6.85	7.03	7.65	2.01	0.56	0.61	0.72	0.80	0.90	1.1 1	1.65
2	Koshk-Chenarsojhate	1.41	1.81	2.36	3.16	3.82	4.53	5.30	1.09	0.34	0.50	0.69	0.91	1.06	1.1 8	1.28
3	Sefid-Dehkadesefid	6.84	7.38	8.03	8.81	9.36	9.89	10.41	4.19	3.73	4.25	4.81	5.39	5.74	6.0 4	6.30
4	Sivand-tangebolaghi	5.65	6.12	6.85	7.12	7.86	8.20	9.30	3.12	0.24	0.29	0.52	0.68	0.75	0.8 6	1.42
5	Sivand-Dashtbal	6.31	7.76	9.53	11.71	13.2 7	14.80	16.29	3.65	2.93	2.76	2.56	2.35	2.02	1.7 0	1.41
6	Shorkharestan-Jamalbeig	2.76	3.39	4.82	7.35	10.1 1	13.08	16.40	1.85	2.46	2.34	2.22	2.07	1.84	1.6 2	1.40
7	Shirin-Jamalbeig	8.32	9.88	12.1 6	15.38	17.9 5	20.63	23.40	5.13	5.62	5.27	4.91	4.54	4.02	3.5 8	3.21

8	Kor-Polekhan	40.4 2	48.9 6	60.9 2	78.03	92.3 1	108.0 0	125.2 7	23.12	15.9 7	15.86	15.83	15.8 2	15.6 2	14. 93	13.6 4
9	Kor-Chamriz	35.1 0	39.4 4	44.7 0	51.09	55.7 0	66.20	64.63	22.50	26.6 1	23.71	22.67	21.4 6	19.4 7	17. 53	15.6 9
10	Kor-Drodzandam	5.70	6.42	7.21	8.04	8.58	9.05	9.47	4.96	54.6 6	48.71	42.96	37.3 8	30.1 6	24. 70	20.5 2
11	Gavgodar-Dehkadesefid	3.16	3.44	3.71	3.96	4.10	4.20	4.28	2.85	9.41	8.81	8.46	8.06	7.45	6.8 7	6.34
12	Nahrazam-Chenarsokhte	1.85	2.01	2.18	2.35	2.47	2.57	2.66	1.67	1.40	1.34	1.27	1.19	1.07	0.9 6	0.86

Table 35: Average annual discharge ratio with different return periods to average discharge with return period of 2 years

Column	River-Station	Return Period						
		2	10	25	50	100	500	1000
1	Babahaji-Polefasa	1.00	1.94	2.49	2.94	3.42	4.64	5.22
2	Koshk-Chenarsojhate	1.00	2.21	2.82	3.28	3.72	4.74	5.18
3	Sefid-Dehkadesefid	1.00	1.58	1.83	2.01	2.18	2.56	2.71
4	Sivand-tangebologhi	1.00	1.89	2.31	2.61	2.91	3.58	3.86
5	Sivand-Dashtbal	1.00	2.46	3.23	3.81	4.38	5.71	6.28
6	Shorkharestan-Jamalbeig	1.00	2.05	2.57	2.94	3.31	4.15	4.51
7	Shirin-Jamalbeig	1.00	1.66	1.96	2.18	2.39	2.87	3.08
8	Kor-Polekhan	1.00	1.93	2.38	2.70	3.02	3.73	4.03
9	Kor-Chamriz	1.00	1.70	2.02	2.24	2.46	2.94	3.14
10	Kor-Drodzandam	1.00	2.06	2.58	2.96	3.34	4.19	4.55
11	Gavgodar-Dehkadesefid	1.00	1.62	1.90	2.10	2.29	2.70	2.87
12	Nahrazam-Chenarsokhte	1.00	1.38	1.54	1.65	1.76	1.98	2.07
Average Kor basin		1.00	1.80	2.18	2.45	2.71	3.31	3.56
Average Sivand basin		1.00	2.18	2.77	3.21	3.65	4.64	5.07
Average Maharlu basin		1.00	1.84	2.29	2.62	2.96	3.79	4.16

Table 36: Monthly and seasonal discharge in representative stations

Column	River-Station	Time	Oct	Nov	Dec	Janu	Feb	Mar	Apr	May	Jun	July	Aug	Sept
1	Babahaji-Polefasa	Monthly	0.60	1.19	2.38	3.35	4.20	4.48	3.36	1.48	0.77	0.49	0.42	0.43
		Seasonal	18.01			51.97			24.23			5.79		
2	Chenarsohate - Koshk	Monthly	0.04	0.23	0.65	1.38	2.05	2.69	2.06	0.37	0.17	0.03	0.01	0.00
		Seasonal	9.15			60.89			29.45			0.50		
3	Dehkaadesefid -Sefid	Monthly	2.77	3.11	3.91	4.54	5.36	8.44	8.97	5.72	3.65	2.88	2.52	2.57
		Seasonal	17.98			33.69			33.67			14.66		
4	Tangebolaghi-Sivand	Monthly	1.44	1.80	2.62	4.72	6.07	7.01	5.36	2.32	1.56	1.33	1.22	1.14
		Seasonal	16.01			48.61			25.28			10.84		
5	Dashtbal-Sivand-	Monthly	1.10	1.55	3.14	5.30	7.29	8.40	6.78	2.61	1.12	0.93	0.81	0.77
		Seasonal	14.55			52.76			26.40			6.31		
6	Shorkharestan-Jamalbeig	Monthly	0.12	0.34	1.69	2.72	3.93	5.23	5.56	2.05	0.55	0.28	0.23	0.20
		Seasonal	9.43			51.84			35.64			3.10		
7	Jamalbeig-Shirin	Monthly	2.25	2.73	4.98	6.20	9.08	14.25	18.24	10.00	4.14	2.93	2.42	2.25
		Seasonal	12.54			37.15			40.74			9.56		
8	Polekhan- Kor	Monthly	14.58	11.81	19.02	29.13	40.61	56.65	67.77	38.38	23.79	19.57	19.19	19.04
		Seasonal	12.63			35.15			36.14			16.08		
9	Chamriz -Kor	Monthly	10.08	12.75	23.45	32.83	41.27	53.96	54.08	28.99	15.01	12.16	10.63	10.06
		Seasonal	15.16			41.94			32.13			10.76		
10	Drodzandam-	Monthly	5.38	3.34	7.41	4.65	8.10	28.87	30.42	25.08	17.99	16.25	17.00	15.52

	Kor													
		Seasonal	8.96			22.87			40.83			27.09		
11	Gavgodar-Dehkadesefid	Monthly	3.27	3.78	6.94	10.76	13.43	14.44	12.48	6.86	3.77	3.34	3.25	3.21
		Seasonal	16.35			45.16			27.03			11.47		
12	Chenarsokhte-Nahrazam	Monthly	1.05	1.32	1.93	1.99	2.15	2.20	2.13	1.47	1.07	1.02	1.02	1.04
		Seasonal	23.38			34.47			25.39			16.75		

Table 37: Base flow and flooded flow at representative stations

Column	River-Station	Dry year						
		10	30	60	90	180	Base flow	Flooded flow
1	Babahaji-Polefasa	2.05	1.86	1.48	1.08	0.85	0.56	0.24
2	Koshk-Chenarsojhate	0.70	0.47	0.26	0.17	0.00	0.02	0.10
3	Sefid-Dehkadesefid	4.45	3.95	3.70	3.55	2.76	1.88	0.48
4	Sivand-tangebolaghi	3.30	3.08	2.64	1.70	0.96	0.99	0.25
5	Sivand-Dashtbal	2.40	1.59	1.18	0.88	0.45	0.33	0.26
6	Shorkharestan-Jamalbeig	1.58	1.26	0.52	0.36	0.16	0.13	0.18
7	Shirin-Jamalbeig	7.84	6.13	3.98	3.30	2.00	1.68	1.09
8	Kor-Polekhan	25.60	22.37	19.14	10.60	5.40	4.33	3.92
9	Kor-Chamriz	23.30	17.70	14.10	13.20	7.32	6.84	2.16
10	Kor-Drodzandam	13.55	12.52	8.20	3.82	1.30	1.07	2.18
11	Gavgodar-Dehkadesefid	5.08	4.69	4.49	4.08	2.38	2.13	0.50
12	Nahrazam-Chenarsokhte	1.40	1.30	1.23	1.17	0.90	0.76	0.18

Column	River-Station	Average year						
		10	30	60	90	180	Base flow	Flooded flow
1	Babahaji-Polefasa	4.98	3.88	2.86	2.04	0.90	0.89	0.51
2	Koshk-Chenarsojhate	2.68	1.55	1.26	0.97	0.12	0.29	0.27
3	Sefid-Dehkadesefid	10.09	7.08	5.97	5.23	3.55	3.77	0.92
4	Sivand-tangebologhi	8.87	7.68	5.99	4.62	2.50	2.12	1.34
5	Sivand-Dashtbal	10.10	9.75	7.46	6.38	4.84	2.97	1.20
6	Shorkharestan-Jamalbeig	11.50	7.80	2.30	1.04	0.55	0.70	0.99
7	Shirin-Jamalbeig	27.10	21.60	13.80	8.99	4.31	4.99	2.65
8	Kor-Polekhan	102.05	71.00	60.14	51.66	19.52	20.94	12.50
9	Kor-Chamriz	86.40	67.00	51.90	38.50	14.60	17.31	9.39
10	Kor-Drodzandam	63.20	52.30	32.40	26.30	14.90	11.81	7.85
11	Gavgodar-Dehkadesefid	17.90	10.50	9.30	8.70	5.22	5.22	1.31
12	Nahrazam-Chenarsokhte	3.58	3.10	2.50	2.24	1.72	1.43	0.36

Column	River-Station	Wet year						
		10	30	60	90	180	Base flow	Flooded flow
1	Babahaji-Polefasa	34.30	21.00	11.80	7.00	2.10	2.79	3.41
2	Koshk-Chenarsojhate	8.14	5.90	5.10	3.75	0.70	1.08	0.93
3	Sefid-Dehkadesefid	25.50	19.90	14.20	9.05	4.86	5.69	2.26
4	Sivand-tangebologhi	39.80	23.80	14.46	12.59	5.86	5.76	3.27
5	Sivand-Dashtbal	49.30	33.80	21.59	17.48	7.45	7.52	4.39
6	Shorkharestan-Jamalbeig	22.22	14.86	10.38	4.30	1.11	1.69	2.24
7	Shirin-Jamalbeig	82.00	53.20	44.70	27.50	5.60	9.51	9.39
8	Kor-Polekhan	458.70	304.99	190.39	105.92	42.90	52.36	43.30
9	Kor-Chamriz	265.60	140.20	98.10	73.60	23.78	33.00	25.25
10	Kor-Drodzandam	291.60	173.00	122.60	44.60	13.03	20.19	26.94
11	Gavgodar-Dehkadesefid	71.12	42.60	31.00	20.00	8.00	9.69	6.65
12	Nahrazam-Chenarsokhte	6.36	4.28	3.05	2.53	1.83	1.56	0.78

Table 38: Run test at representative stations

Column	River-Station	Number Of data	na	nb	u	Limit u	Test result
1	Khosk-Chenarsokhte	27	14	13	9	(9-20)	Data is homogeneous
2	Rahdar-Chenarrahdar	28	12	16	11	(9-21)	Data is homogeneous
3	Sefid-Dehkadesefid	26	19	7	11	(9-21)	Data is homogeneous
4	Sivand-Tangebolaghi	22	5	17	9	(4-12)	Data is homogeneous
5	Sivand-Rahmatabad	22	5	17	9	(4-12)	Data is homogeneous
6	Sivand-Dashtbal	27	7	20	9	(6-16)	Data is homogeneous
7	Shorkharestan-Jamalbeig	30	10	20	14	(9-20)	Data is homogeneous
8	Shirin-Jamalbeig	37	15	12	9	(8-20)	Data is homogeneous
9	Kor-Polekhan	29	8	21	15	(8-18)	Data is homogeneous
10	Kor-Tangeboragh	16	5	11	7	(4-12)	Data is homogeneous
11	Kor-Chamriz	35	16	19	15	(13-25)	Data is homogeneous
12	Gavgodar-Dehkadesefid	20	10	10	15	(6-16)	Data is homogeneous
13	Nahrazam-Chenarsokhte	27	18	9	13	(8-18)	Data is homogeneous

Table 39: Relationship between maximum momenta and maximum daily discharge

Column	River-Station	Common Year	Coefficient Correlation	Relationship
1	Khosk-Chenarsokhte	27	0.75	$Y=0.288X^{0.1155}$
2	Rahdar-Chenarrahdar	23	0.88	$Y=2.3721X^{0.9492}$
3	Sefid-Dehkadesefid	22	0.98	$Y=1.2241X^{1.0417}$
4	Sivand-Tangebolaghi	22	0.98	$Y=1.2241X^{1.0417}$
5	Sivand-Rahmatabad	22	0.99	$Y=1.008X^{1.0997}$
6	Sivand-Dashtbal	27	0.99	$Y=0.6539X+2.4293$
7	Shorkharestan-Jamalbeig	30	0.91	$Y=1.8743X^{0.9207}$
8	Shirin-Jamalbeig	26	0.94	$Y=2.0502X^{0.9131}$
9	Kor-Polekhan	28	0.98	$Y=1.1475X^{1.0003}$
10	Kor-Tangeboragh	17	0.99	$Y=1.008X^{1.0997}$
11	Kor-Chamriz	34	0.81	$Y=1.1936X+131.9$
12	Gavgodar-Dehkadesefid	18	0.93	$Y=1.496X^{0.9611}$
13	Nahrazam-Chenarsokhte	27	0.85	$Y=1.8696X-7.1012$

Table 40: Correlation to reconstruct moment discharge

Column	Base Station	Completed Station	Relationship	R	Number of data
1	Polekhan (Kor)	Dashtbal	$Y=0.0348X^{1.38}$	0.85	39
2	Chamriz	Tangeboragh(Kor)	$Y=0.1203X^{1.1429}$	0.88	17
3	Chamriz	Jamalbeig(shirin)	$Y=0.1266X^{1.1007}$	0.83	20
4	Chamriz	Chenarrahdar	$Y=0.0022X^{1.5618}$	0.70	28
5	Chamriz	Dehkadesefid(sefid)	$Y=0.0134X^{1.3725}$	0.82	18
6	Chamriz	Dehkadesefid(Gavgod)	$Y=0.0152X^{1.3734}$	0.89	21
7	Dashtbal	Tangebolaghi	$Y=0.136X^{0.09071}$	0.94	15
8	Dashtbal	Jamalbeige(shorkhares)	$Y=6.7876X^{0.4037}$	0.72	24
9	Dashtbal	Chenarsokhte(Nahraza)	$Y=3.6732X^{0.5437}$	0.79	21
10	Dashtbal	Chenarsokhte(Khoshk)	$Y=9.6504X^{0.3723}$	0.65	20
11	Dashtbal	Rahmatabad	$Y=1.0395X^{0.9436}$	0.97	15

Table 41: Maximum momenta discharge during base period

Sivand		Sefid		Rahdar		Khoshk		River
Tangebologhi		Dehkdesefid		Chenarrahdar		Chenarsokhte		Station
Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Year
	4.8		9.9		4.0		18.2	1970-71
	77.9		98.8		55.4		57.4	1971-72
	45.3		13.4		5.7		45.9	1972-73
	6.9		25.7		12.0		21.2	1973-74
	9.2	31.3	52.8	10.30	17.5	4.5	15	1974-75
	19.5	27.8	40.0	12.97	23.3	15.3	23.2	1975-76
	6.2	10.47	18.0	3.36	4.4	1.60	7.4	1976-77
	653.4	66.03	121.8		82.5	36.12	70.2	1977-78
	23.8	50.0	80.15	2.10	2.5	8.18	24.0	1978-79
	72.6	42.30	76.2		35.0	11.20	30.1	1979-80
	18.8	7.4	22.5	2.37	2.9	15.01	37.2	1980-81
	19.5	23.00	40.2	3.46	3.79	5.77	18.7	1981-82
	7.9	14.60	24.9	6.83	10.6	21.09	47.6	1982-83
	37.4	39.97	71.8	20.50	40.9	51.68	90.8	1983-84
	13.1	26.17	46.0	3.14	4.1	12.53	32.7	1984-85
4.44	5.6	16.7	42.5	10.46	17.9	17.9	35.0	1985-86
	507.3	24.7	38.2		84.2		123.7	1986-87
17.3	33.5	45.56	82.4	64.52	81.5	14.6	28.0	1987-88
5.59	7.2	3.7	4.7	36.44	74	22.1	64.0	1988-89
31.2	43.3	14.79	25.3		43.1	35.9	72.0	1989-90
7.19	9.4	27.2	51.2		26.1	24.7	40.0	1990-91
16.20	22.7		111.7	53.07	165	16.3	75.6	1991-92
59.2	61.3		167.5	33.72	92	16.8	34.2	1992-93
13.4	16.7	5.96	9.7	32.47	42	17.9	64.0	1993-94
215.1	350.0	41.3	130.0	37.16	82	37.7	75.0	1994-95
19.3	27.2	30.3	48.0	21.5	41.8	22.7	72.2	1995-96
9.40	12.6	20.1	38.2	15.5	42	6.5	17.0	1996-97
71.8	96.0	114.0	148.0	12.7	23	55.9	90.8	1997-98
139.0	340.0	22.1	41.0	24	58	51.1	61.0	1998-99

8.3	11.2	6.5	8.0	21.9	45		31.1	1999-2000
3.5	4.0	6.7	8.8	3.26	4.3	0.30	2.2	2000-1
230.0	444.0	79.6	124.0	64	136	43.6	112.0	2001-2
20.6	29.0	74.9	199.3	11.9	21.5	29.8	50.0	2002-3
30.8	74.6	70.6	138.0	36.3	106.8	41.0	80.3	2003-4
170.0	232.5	23.2	30.0	24.3	31.8	64.9	93.3	2004-5
24.4	29.4	64.8	65.1	17.6	47.1	18.2	56.0	2005-6
66.9	67.8	36.6	44.6	7.7	27.6	43.9	46.10	2006-7
6.91	7.3	6.5	7.5	0.6	0.8	0.93	1.80	2007-8
3.02	3.9	8.6	13.1	0.8	1	0.248	9.28	2008-9
1.58	2.0	4.6	6.8	0.3	1.1	1.23	3.00	2009-10
0.167	0.3	44.3	45.6	2.4	30.6	10.4	20.90	2010-11
7.64	8.0	65.6	66.3	22.5	31.6	18.8	42.50	2011-12
8.72	9.0	23.9	24.2	9.4	10.5	11.4	12.5	2012-13

Kor		Kor		Sivand		Sivand		River
Polekhan		Tangeboragh		Rahmatabad		Dashtbal		Station
Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Year
34.0	64.4	9.7	13.9		5.2	5.2	5.5	1970-71
237.0	542.0	176.7	180.0		95.2	83.90	119.9	1971-72
71.7	100.0	25.4	26.2		54.2	46.2	66.0	1972-73
129.6	155.5	86.4	93.5		7.7	7.4	8.3	1973-74
127.15	152.7	56.8	75.8		10.3	10.2	11.4	1974-75
204.5	208.0	88.4	92.0		22.5	20.9	26.0	1975-76
65.30	80.9	22.1	34.3		6.8	6.25	7.3	1976-77
1750.4	2000.0	202.2	220.0		869.3		1250.3	1977-78
151.6	153.3	65.9	100.4		27.7	24.90	32.5	1978-79
345.2	395.6	131.4	153.0		88.4	78.00	110.9	1979-80
90.0	109.9	87.0	91.0		21.7	19.60	25.1	1980-81
116.50	140.5	62.0	81.5		22.5	20.30	26.0	1981-82
59.10	73.6	87.3	145.0		8.8	8.00	9.6	1982-83
75.39	91.80	36.1	93.0		44.4	39.56	53.4	1983-84

68.75	85.0	59.9	79.1		14.9	13.50	16.8	1984-85
25.82	33.4	31.7	45.7		3.8	3.52	4.0	1985-86
406.7	447.0		271.7		668.0	571.58	945.8	1986-87
262.60	304.8		195.9		24.1	21.3	28.0	1987-88
38.80	49.3		38.9		11.7	10.65	13.0	1988-89
128.3	185.0		166.4		42.9	36.4	51.6	1989-90
105.6	113.1		115.4	8.20	10.1	13.96	17.4	1990-91
199.0	224.1		221.4	14.3	19.7	34.75	46.5	1991-92
605.6	700.0		310.3	68.6	87.6	82.8	94.2	1992-93
52.2	65.4		46.3	15.7	22.9	16.9	24.0	1993-94
270.3	282.0		235.9	126.6	192.8	91.0	205.0	1994-95
238.0	240.8		131.3	40.0	83.0	53.5	56.9	1995-96
49.5	50.8		66.7	9.0	9.1	10.8	11.1	1996-97
318.0	321.0		239.5	59.9	79.0	91.0	121.0	1997-98
368.0	420.5		133.6	220.0	327.0	252.0	369.0	1998-99
97.4	120.0		42.6	18.2	24.5	14.2	23.2	1999-2000
39.4	40.4		34.4	4.7	4.8	4.04	4.6	2000-1
409.0	454.0		234.8	231.0	330.0	395.0	600.0	2001-2
68.8	106.5		181.8	27.2	38.0	42.0	79.6	2002-3
306.0	326.0		230.6	114.0	299.2	248.0	391.3	2003-4
589.0	652.0		112.1	149.0	314.8	255.0	360.0	2004-5
64.7	65.1		141.3	26.2	45.1	25.0	30.4	2005-6
162.0	175.9			72.3	79.8	71.5	82.3	2006-7
42.0	43.2			4.92	5.0	4.0	4.1	2007-8
24.5	26.5			2.02	2.1	1.4	2.2	2008-9
45.1	54.0			1.48	1.6	1.6	1.6	2009-10
50.4	57.0			1.11	1.2	0.0	0.0	2010-11
80.1	95.7			2.25	2.5	2.4	3.1	2011-12
56.6	60.0			1.46	1.7	2.5	9.3	2012-13

Nahrazam		Gangodar		Shirin		Shorkharestan		Kor		River
Chenarsokhte		Dehkadesefid		Jamalbeig		Jamalbeig		Chamriz		Station
Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Equivalent daily	Maximum momente	Year
	9.3		11.2	61.1	90.3		13.5	41.57	122.7	1970-71
	49.6		112.8	104.80	145.0		46.9	472.00	657.8	1971-72
	35.8		15.2	71.6	105.0		36.8	90.7	153.0	1972-73
	11.6		29.3	45.1	58.2		15.9	182.4	246.5	1973-74
8.6	17.37	83.0	85.6	49.7	54.5	12.6	13.0	187.6	208.7	1974-75
5.88	8.78		45.6		77.4	18.8	26.1	118.5	340.0	1975-76
3.35	6.7		13.6	49.60	72.7	4.60	7.9	50.91	141.2	1976-77
5.63	11.3	146.5	148.0		211.8	48.57	65.0	682.00	848.3	1977-78
9.27	18.7	40.8	65.2	33.56	50.7	33.56	46.7	35.1	280.0	1978-79
8.41	17.0		75.3		115.8	19.11	28.3	309.6	490.0	1979-80
9.70	19.6		17.6		36.1	11.2	14.7	117.7	170.0	1980-81
4.79	9.6		64.9	105.80	146.2	21.1	38.8	244.3	440.0	1981-82
6.48	13.0		45.3	40.37	60.2	8.67	13.9	180.72	338.8	1982-83
36.67	75.4		51.5	73.20	104.1	9.67	15.4	206.70	371.8	1983-84
12.65	25.7		33.3	51.47	75.3	26.55	37.9	130.62	270.7	1984-85
13.65	44		27.5	51.5	86.8	4.3	16.5	106.66	235.3	1985-86
117.25	217	68.7	82.0	118.0	157.0	18.3	20.1	538.6	860.0	1986-87
14.27	29.0	82.8	105.0		156.9	12.9	76.1	344.8	646.0	1987-88
27.6	72		15.8		33.1	16.3	23.1	103.8	157.0	1988-89
22.74	37	118.9	129	102.0	161.3	42.4	64.5	137.7	560.0	1989-90
20.05	28.5	55.9	84.5	111.7	172.6	28.8	35.6	143.7	406.5	1990-91
13.53	53	102.0	246	144.5	171.0	29.3	32.2	513.9	719.0	1991-92
23.09	45	102.3	120.8	222.9	281.0	19.2	26.7	750.6	966.0	1992-93
17.92	48	26.0	28.17	6.14	10.6	1.58	3.0	113.9	183.0	1993-94
27.4	58	144.4	168.6		187.6	33.6	48.75	396.9	760.0	1994-95
8.13	19	32.6	42.8		106.7	19.5	22	244.5	455.0	1995-96
5.47	9.9	14.9	25	48.9	59.0	17.8	21.6	132.5	251.6	1996-97
35.75	54.2	116.0	161	173.0	180.0	153.0	160	476.0	770.0	1997-98
31.4	45	90.3	105	23.0	28.0	46.3	49	432.0	462.0	1998-99
	20.3	11.0	13.2	10.8	17.9	14.0	24.6	97.2	170.0	1999-2000

2.28	4.5	6.5	9.4	14.0	22.5	2.9	4.05	58.2	141.0	2000-1
73.9	180	113.7	127.5	124.0	145.0	54.9	106.3	490.0	757.0	2001-2
28.6	45.0	48.2	63.1	77.0	110.8	31.8	85.4	256.0	605.0	2002-3
32.2	96.3	186.0	217.8	91.2	130.5	73.6	87.9	612.0	745.0	2003-4
42.1	90.9	30.8	33.6	52.4	108.2	33.6	71.3	234	396.2	2004-5
8.8	12.9		74.3	68.5	185.0	11.2	14.9	310.0	485.3	2005-6
43.9	79.7			64.9	87.4	43.4	70.0	198.0	256.2	2006-7
3.19	80.7			8.45	15.3	1.4	1.8	58.3	58.9	2007-8
3.29	10.5			23.1	35.6	3.5	5.7	46.7	45.0	2008-9
2.34	4.0			18.8	27.1	3.9	10.2	44.8	87.6	2009-10
12.6	17.3			81.1	98.3	46.3	68.3	60.1	61.2	2010-11
27.2	49.5			38.8	61.7	27.6	29.0	80.6	84.4	2011-12
10.6	15.6			38.1	62.3	13.3	15.5	104.0	106.0	2012-13

Table 42: Statistic parameters and maximum momenta discharge in different return periods

Column	River- Station	Statistic Parameters				Return Period							
		Average	Standard division (s)	Skwnes S(g)	(CV)	2	3	5	10	25	50	100	200
1	Khoshk- Chenarsokhte	45.42	30.55	0.62	0.67	40.20	56.53	73.01	89.98	105.46	113.41	119.03	122.93
2	Rahdar- Chenarrahdar	38.90	38.11	1.43	0.98	22.84	39.80	63.73	99.61	155.60	190.45	230.48	270.07
3	Sefid- Dehkadesefid	57.25	48.43	1.19	0.85	39.61	60.02	87.21	127.27	183.63	233.69	284.92	339.13
4	Sivand- Tangebolaghi	80.75	149.62	2.57	1.85	21.43	43.83	88.48	192.37	452.20	797.80	1340.54	2175.47
5	Sivand- Dashtbal	124.38	253.52	3.22	2.04	54.48	94.35	159.11	278.75	506.79	745.58	1055.06	1449.63
6	Sivand- Rahmatabad	93.76	177.62	3.06	1.89	22.81	48.56	102.52	235.92	594.99	1103.64	1950.61	3323.35
7	Shorkharestan- Jamalbeige	37.56	32.22	1.69	0.86	27.55	40.28	56.12	77.72	106.64	128.88	151.45	174.37
8	Shirin- Jamalbeig	100.06	61.38	0.66	0.62	89.08	113.67	140.94	175.27	218.66	250.84	282.78	314.61
9	Kor-Polekhan	234.11	324.06	4.41	1.38	147.03	231.86	357.65	569.44	934.94	1287.81	1717.59	2235.46
10	Kor- Tangeboragh	129.86	78.68	0.47	0.61	117.23	151.59	187.14	228.53	276.51	309.68	341.03	370.99
11	Kor-Chamriz	383.95	260.45	0.58	0.68	306.56	429.93	579.59	779.61	1041.57	1238.52	1434.52	1628.63
12	Gavgodar- Dehkadesefid	57.25	48.43	1.19	0.85	55.42	75.40	101.03	138.38	193.46	240.21	291.82	348.70
13	Nahrazam- Chenarsokhte	41.77	43.32	2.44	1.04	25.90	39.55	59.59	93.27	151.76	208.87	279.33	365.50

Table 43: Flood ratio with different return periods to flood with return period of 100 years

Column	River-Station	Return Period							
		2	3	5	10	25	50	100	200
1	Tangebostanak-Menjan	0.34	0.47	0.61	0.76	0.89	0.95	1.00	1.03
2	Tangeshol-Badamak	0.10	0.17	0.28	0.43	0.68	0.83	1.00	1.17
3	Sefid-Dehkadesefid	0.41	0.21	0.31	0.45	0.64	0.82	1.00	1.19
4	Nahrramjerd-Ahmadabad	0.02	0.03	0.07	0.14	0.34	0.60	1.00	1.62
5	Shorkharestan-Jamalbeig	0.05	0.09	0.15	0.26	0.48	0.71	1.00	1.37
6	Kor-Polekhan	0.01	0.02	0.05	0.12	0.31	0.57	1.00	1.70
7	Kor-Drodzandam	0.18	0.27	0.37	0.51	0.70	0.85	1.00	1.15
8	Gavgodar-Dehkdesefid	0.32	0.40	0.50	0.62	0.77	0.89	1.00	1.11
9	Sivand-Tangebologhi	0.09	0.13	0.21	0.33	0.54	0.75	1.00	1.30
10	Sivand-Dashtal	0.34	0.44	0.55	0.67	0.81	0.91	1.00	1.09
11	Sivand-Rahmatabad	0.21	0.30	0.40	0.54	0.73	0.86	1.00	1.14
12	Nahrazam-Chenarsokhte	0.19	0.26	0.35	0.47	0.66	0.82	1.00	1.19
13	Rahdar-Chenarrahdar	0.09	0.14	0.21	0.33	0.54	0.75	1.00	1.31
Average		0.16	0.23	0.31	0.43	0.62	0.79	1.00	1.26

Table 44: Discharge from well, Qantas, spring (cubic million meters)

Column	Study area	Code	Aquifer					
			Well		Qanat		Spring	
			Number	Discharge	Number	Discharge	Number	Discharge
1	Tavabee Arsanjan	4301	1912	58.27	2	0.00	6	0.00
2	Arsanjan	4302	616	121.43	2	0.87	13	3.77
3	Seydan-Farough	4303	1781	169.23	23	17.51	10	11.76
4	South Tashk lake	4304	5	0.02	0	0.00	3	0.00
5	Jahanabad Bakhtegan	4305	618	128.91	3	5.65	17	3.60
6	Khanekate	4306	541	27.23	11	1.48	0	1.44
7	Khir	4307	277	28.81	3	0.00	6	0.00
8	Estahban	4308	56	21.81	2	0.27	1	15.76
9	Neyriz	4309	417	43.77	9	5.90	5	3.27
10	Tangehana-Pichakan	4310	205	32.02	1	0.03	0	0.03
11	Marvdasht-Kherameh	4311	9323	837.69	3	0.12	18	28.42
12	Darian	4312	780	94.57	3	0.63	0	0.63
13	Saadatabad	4313	751	164.94	7	9.75	0	4.70
14	Sarpaniran	4314	254	16.93	28	8.98	0	3.04
15	Ghaderabad-Madarsoliman	4315	609	49.85	202	52.58	18	40.94
16	Dehbid	4316	415	85.86	139	53.67	13	51.91
17	Namdan	4317	2597	495.91	28	9.11	4	44.99
18	Beiza-Zarghan	4318	4893	283.86	74	6.36	48	6.36
19	Dozhord-Kamphirouz	4319	1534	69.58	13	0.71	3	0.71
20	Khosroshirin	4320	50	10.48	24	6.36	15	87.72
21	Asopas	4321	1504	288.00	35	12.53	19	7.22
22	Bakan	4322	364	55.76	0	0.00	2	4.47
23	Shiraz	4323	2247	82.52	25	31.27	12	31.27
24	Gharebagh	4324	2446	100.21	4	0.00	6	0.00
25	Kavar Maharlu	4325	828	97.90	0	0.00	0	0.00
26	Sarvestan	4326	1125	62.77	11	0.85	0	0.85
27	Goshnegan	4327	177	12.97	0	0.00	2	0.00

45: Number of water resources and discharge in elevation

Column	Study area	Code	Aquifer					
			Well		Qanat		Spring	
			Number	Discharge	Number	Discharge	Number	Discharge
1	Tavabee Arsanjan	4301	163.00	4.29	0.00	0.00	1.00	0.00
2	Arsanjan	4302	106.00	12.51	8.00	3.78	9.00	0.28
3	Seydan-Farough	4303	91.00	12.00	11.00	6.07	9.00	1.83
4	South Tashk lake	4304	0.00	0.00	0.00	0.00	0.00	0.00
5	Jahanabad Bakhtegan	4305	131.00	11.96	6.00	0.58	73.00	24.66
6	Khanekate	4306	83.00	2.95	1.00	0.39	1.00	0.00
7	Khir	4307	56.00	2.95	0.00	0.00	8.00	0.09
8	Estahban	4308	28.00	12.44	0.00	0.00	12.00	5.68
9	Neyriz	4309	23.00	8.49	18.00	0.76	65.00	0.86
10	Tangehana-Pichakan	4310	18.00	2.28	8.00	0.04	8.00	0.04
11	Marvdasht-Kherameh	4311	638.00	57.27	10.00	4.36	32.00	25.05
12	Darian	4312	50.00	7.26	2.00	0.71	4.00	0.37
13	Saadatabad	4313	106.00	14.16	0.00	0.00	5.00	0.69
14	Sarpaniran	4314	27.00	0.23	0.00	0.00	0.00	0.00
15	Ghaderabad-Madarsoliman	4315	663.00	41.81	51.00	9.01	25.00	19.08
16	Dehbid	4316	12.00	0.62	40.00	3.12	15.00	2.42
17	Namdan	4317	92.00	12.00	23.00	2.85	15.00	30.23
18	Beiza-Zarghan	4318	804.00	45.78	58.00	12.07	69.00	15.11
19	Dozhord-Kamphirouz	4319	314.00	6.63	0.00	0.00	366.00	45.27
20	Khosroshirin	4320	7.00	0.57	3.00	1.14	5.00	4.99
21	Asopas	4321	85.00	11.53	4.00	0.00	3.00	15.63
22	Bakan	4322	58.00	8.95	0.00	0.00	0.00	0.00
23	Shiraz	4323	552.00	35.40	9.00	8.39	78.00	22.24
24	Gharebagh	4324	476.00	26.41	5.00	0.00	7.00	2.30
25	Kavar Maharlu	4325	72.00	11.76	0.00	0.00	0.00	0.00
26	Sarvestan	4326	57.00	3.37	7.00	0.28	21.00	3.99
27	Goshnegan	4327	100.00	6.79	0.00	0.00	4.00	0.04

Table 46: Chemical quality parameters for surface water

Column	River	Station	Discharge Parameter	Discharge (m3/s)	Na ⁺	Mg ⁺²	Ca ⁺²	So ₄ ⁻²	Cl ⁻	Hco ₃ ⁻	Ph	Ec (μs/cm)	TDS (mg/lit)
					Meq/lit								
1	Gavgodar	Dehkde sefid	Max	31.54	0.27	0.45	2.55	0.40	0.50	2.50	8.10	315.00	221.00
			Min	0.12	0.29	1.40	1.70	0.15	0.35	3.00	7.50	369.00	225.00
2	Sefid	Dehkde sefid	Max	73.79	0.17	0.30	2.80	0.05	0.30	3.00	7.90	279.00	130.00
			Min	0.44	0.53	0.95	2.05	0.15	0.75	2.95	7.70	354.00	245.00
3	Kor	Tange boragh	Max	36.40	0.64	2.80	1.20	0.88	0.60	3.40	7.50	741.00	306.00
			Min	0.55	0.65	1.60	1.60	0.92	0.30	2.50	7.80	390.00	234.00
4	Dozkord	Tange boragh	Max	28.97	0.21	1.80	1.80	0.73	0.40	2.80	8.10	394.00	249.00
			Min	0.54	0.70	1.30	2.10	1.00	0.50	2.70	7.50	400.00	260.00
5	Shorkhare stan	Jamalbeig	Max	118.00	50.40	2.00	5.00	0.40	55.00	4.00	7.70	6146.00	3564.00
			Min	0.01	150.00	4.30	6.90	3.00	155.00	2.40	7.90	#####	9660.00
6	Shirin	Jamalbeig	Max	29.59	2.90	1.20	3.00	0.18	3.60	3.50	8.20	755.00	497.00
			Min	0.08	152.00	4.00	5.00	4.10	155.00	2.50	8.10	#####	9690.00
7	Kor	Chamriz	Max	346.00	0.50	1.00	1.60	1.00	0.30	1.90	7.90	325.00	210.00
			Min	0.15	1.45	0.90	2.60	0.25	1.40	3.15	8.00	485.00	322.00
8	Kor	Hassan abad	Max	136.00	3.10	1.30	4.40	0.82	3.50	4.50	8.20	864.00	575.00
			Min	0.07	42.40	15.50	8.50	17.50	42.00	3.90	7.50	5888.00	3899.00
9	Kor	Khanmin	Max	143.00	0.77	1.45	1.40	0.42	0.80	2.30	7.80	378.00	206.00
			Min	1.04	1.80	1.50	2.20	0.40	1.80	3.50	8.10	565.00	361.00
10	Tangeshol	Badamak	Max	8.41	0.10	1.50	2.70	0.12	0.30	4.00	8.40	435.00	336.00

			Min	0.01	0.20	2.25	1.30	1.20	0.40	2.50	8.20	335.00	191.00
11	Narrrsmjerd	Ahmad Abad Ramjerd	Max	105.75	0.91	1.90	1.90	0.65	1.10	3.10	7.60	489.00	270.00
			Min	0.01	1.75	0.70	2.50	0.55	2.00	2.50	7.50	560.00	330.00
12	Maien	Zargham abad	Max	21.10	0.60	0.80	1.80	0.30	0.10	2.80	7.70	335.00	210.00
			Min	0.23	0.30	1.20	3.70	0.60	0.15	4.40	7.30	505.00	330.00
13	Maien	Bidkal	Max	25.80	0.25	0.75	0.75	0.20	0.40	3.55	7.90	340.00	261.00
			Min	0.01	0.42	0.30	5.30	0.20	0.50	5.30	6.93	585.00	390.00
14	Saraiten	Shadkam	Max	4.64	0.48	1.60	1.80	0.08	0.40	3.30	7.80	396.00	286.00
			Min	0.01	0.92	1.70	2.10	0.40	0.50	3.90	7.60	412.00	360.00
15	Input kaftar lake	Kaftar	Max	4.64	0.48	1.60	1.80	0.08	0.40	3.30	7.80	396.00	286.00
			Min	0.01	4.36	4.00	0.60	0.25	4.00	3.00	9.40	902.00	534.00
16	Sivand	Chambaian	Max	42.70	3.66	2.90	3.10	3.00	2.50	4.40	8.10	923.00	630.00
			Min	0.33	6.25	3.00	3.00	4.20	4.20	4.30	8.00	1260.00	775.00
17	Galedar	Ghader abad	Max	3.35	0.26	0.90	1.90	0.32	0.20	2.40	7.90	290.00	192.00
			Min	0.01	1.74	1.80	2.40	1.33	1.00	3.70	7.30	610.00	385.00
18	Sivand	Polekhan	Max	16.40	2.40	2.80	2.90	1.50	1.60	5.10	7.60	785.00	530.00
			Min	0.05	10.5 8	3.20	3.60	4.00	5.90	7.80	7.10	1764.00	1130. 00
19	Sivand	Dashtbal	Max	461.50	0.11	0.60	2.80	0.10	0.20	3.25	7.80	322.00	233.00
			Min	0.02	2.40	2.90	3.30	1.60	1.30	5.60	7.50	830.00	530.00
20	Kor	Polekhan	Max	915.00	5.55	4.20	6.30	3.27	6.80	5.40	7.00	1460.00	1027.0 0
			Min	0.54	11.1 5	2.50	4.50	6.75	8.50	3.90	7.60	2075.00	1196.0 0
21	Kor	Jahanabad Kherameh	Max	103.20	4.36	3.15	3.00	1.25	5.15	4.10	7.90	1100.00	715.00
			Min	0.04	12.5 0	5.00	4.00	4.50	13.2 0	3.60	6.70	2050.00	1325. 00
22	Khoshk	Chenar Sokhte	Max	46.30	0.25	1.70	6.80	6.00	0.80	1.80	7.70	821.00	564.0 0
			Min	0.01	7.65	9.90	9.40	17.20	8.70	2.40	7.90	2562.00	1748. 00
23	Babahaji	Polefasa	Max	29.50	26.4 0	9.10	6.00	11.00	27.2 0	3.40	8.40	3700.00	2500. 00
			Min	0.00	312. 00	90.50	18.25	60.00	352. 50	4.70	7.60	#####	#### ###
24	Ghadamga h	Ghadamga h	Max	2.44	0.06	0.20	2.00	0.08	0.10	2.40	8.00	259.00	158.0 0

	Spring		Min	0.01	0.02	0.80	2.00	0.15	0.15	2.60	8.30	283.00	188.00
25	Margan	Margan	Max	5.97	0.30	1.40	2.00	0.40	0.40	3.00	7.00	385.00	245.00
			Min	0.12	0.40	1.20	2.00	0.40	0.40	2.29	6.50	360.00	235.00
26	Kor	Nasrabad	Max	5.00	0.20	1.10	2.30	0.10	1.30	3.50	8.00	340.00	248.00
			Min	0.01	0.19	0.80	2.00	0.05	0.30	2.65	8.20	266.00	198.00
27	Gazdam	Maron	Max	0.66	0.90	6.20	9.10	11.80	0.80	3.20	7.70	1270.00	1027.00
			Min	0.00	1.40	7.00	15.00	20.00	1.65	1.95	7.90	1808.00	1483.00
28	Khoshk	Maron	Max	9.00	0.98	7.90	10.60	16.00	0.95	2.70	7.60	1616.00	1254.00
			Min	0.00	1.26	8.25	16.00	22.00	1.20	2.50	7.80	1870.00	1615.00
29	Gharejive Spring	Hosseinabad	Max	0.71	0.37	1.10	2.30	0.46	0.40	3.10	8.10	392.00	261.00
			Min	0.07	0.40	2.30	1.20	0.60	0.35	2.90	8.30	362.00	221.00
30	Paskohak	Aliabad	Max	102.60	0.98	4.20	10.40	10.00	1.20	3.75	7.70	1289.00	979.00
			Min	0.00	1.50	6.80	11.80	15.00	1.85	2.75	7.50	1663.00	1272.00
31	Maron	Aliabad	Max	107.30	1.30	6.20	12.40	15.00	1.45	3.15	7.30	1644.00	1266.00
			Min	0.00	0.53	3.80	3.00	5.00	0.65	2.30	7.90	692.00	498.00
32	Khoshk	Aliabad	Max	1.88	0.29	2.10	2.90	1.20	0.40	3.75	8.00	447.00	346.00
			Min	0.00	0.70	3.71	4.44	6.25	0.80	2.60	7.60	824.00	603.00
33	Kor	Khosroshirin	Max	9.50	0.50	1.20	2.30	0.44	0.50	3.10	7.50	408.00	265.00
			Min	0.99	0.53	0.90	2.35	0.25	0.75	2.90	8.00	327.00	254.00
34	Chobkhale	Chobkhale	Max	19.60	0.28	1.10	2.30	0.20	0.30	3.30	8.10	371.00	242.00
			Min	0.70	0.65	0.80	1.30	0.50	0.30	2.00	8.20	320.00	165.00

													0
35	Abadetashk	Abadetashk	Max	8.89	0.17	2.90	1.60	0.90	0.30	3.40	8.40	545.00	305.00
			Min	0.01	0.20	1.20	2.40	0.43	0.40	3.10	8.50	344.00	254.00
36	Tangebostanak	Menjan	Max	4.58	0.23	1.30	2.50	0.05	0.30	3.80	7.90	390.00	266.00
			Min	0.01	0.45	1.60	1.40	0.45	0.20	2.90	7.10	340.00	225.00
37	Rahdar	Chenarrahdar	Max	24.50	9.25	8.00	22.00	25.00	10.00	2.40	7.80	3403.00	2456.00
			Min	0.00	10.35	16.50	16.00	30.00	11.00	2.70	7.70	3454.00	2645.00
38	Kor	Drodzandam	Max	121.70	0.98	2.10	2.00	0.90	1.30	3.00	8.10	523.00	331.00
			Min	121.70	0.98	2.10	2.00	0.90	1.30	3.00	8.10	523.00	331.00
39	Kor	Drodzandam	Max	715.20	1.45	1.40	2.40	0.15	1.60	3.40	7.70	514.00	340.00
			Min	0.07	1.85	1.40	1.80	0.30	2.10	2.60	7.90	539.00	327.00
40	Tangechaho	Shahrak	Max	5	0	1	3	1	0	3	8	375	260
			Min	0	1	2	3	2	0	4	7	618	390
41	Drainage	Kohsabz	Max	163	35	5	13	19	23	6	9	4455	3050
			Min	0	20	4	5	13	11	6	8	2475	1954
42	Mahmod Abad Drainage	Airport	Max	3	32	27	12	38	25	9	7	5620	4450
			Min	0	80	69	13	93	62	8	8	11670	10070
43	Khoshk	Polebaghsafa	Max	54	0	1	4	3	0	2	8	439	313
			Min	0	18	7	9	4	26	5	7	3250	2080
44	Nahrazam	Chenarsokhte	Max	91	1	2	3	1	1	4	8	506	377
			Min	0	3	4	10	11	3	2	8	1480	915
45	Dehbid	Dehbid	Max	0	1	2	2	1	0	3	9	365	189
			Min	0	1	1	3	2	1	3	7	510	330
46	Bono Spring	Mashhad Morghab	Max	2	0	1	3	0	1	3	7	300	195
			Min	0	1	3	4	4	1	3	8	733	584
47	Simakan	Didegan	Max	2	0	1	1	1	0	1	9	256	178

			Min	0	1	2	2	1	1	4	8	570	375
48	Sivand	Tange Bolaghi	Max	36	2	1	2	1	1	3	8	549	345
			Min	0	1	2	3	1	1	5	8	632	501
49	Sivand	Rahmat abad	Max	38	2	2	2	1	2	4	8	757	447
			Min	1	2	2	3	2	2	420	8	667	456
50	Sivand	Emad abad	Max	73	1	2	2	1	1	3	8	497	344
			Min	0	7	7	2	4	5	7	9	1660	1089
51	Saraiten	Pole Saraiten	Max	38	2	4	2	1	1	7	8	711	515
			Min	0	1	3	2	0	1	6	8	647	468
52	Kor	Jonaki	Max	258	1	1	3	0	2	3	8	556	364
			Min	0	0	2	3	1	1	4	8	466	330
53	Kor	Kheir abad	Max	240	17	12	3	7	21	3	8	3003	1828
			Min	2	11	8	4	6	12	5	7	2247	1444
54	Left Drainage	Kherameh	Max	21	70	28	7	20	81	4	8	9545	6157
			Min	1	185	52	14	33	195	5	7	17010	14003
55	Right Drainage	Kherameh	Max	190	46	18	9	13	54	3	8	7128	4330
			Min	0	37	13	7	14	38	6	8	5727	3568
56	Spring	Ghasr ghomshe	Max	9	1	3	1	2	0	3	8	413	287
			Min	0	1	3	3	1	1	4	7	520	405
57	Ahochar drainage	Zarghan	Max	345	56	24	6	20	62	5	8	8360	5830
			Min	0	38	17	5	16	42	4	9	6216	3710
58	Sarab Spring	Hassan abad	Max	13	3	2	3	0	3	3	8	726	458
			Min	0	0	1	2	0	0	4	8	421	262

Table 47: Result of chemical evaluate of surface water

Column	Station	River	EC ($\mu\text{S}/\text{cm}$)	Water Type	Hydrochemical facies	Drinking	Agriculture
1	Ahmadabad Nahrramjerd	Nahrramjerd	577	Bicarbonate	Clasic	Good	C2S3
2	Abade Tashk	Abade Tashk	320	Bicarbonate	Clasic	Good	C2S1
3	Badamak	Tangeshol	431	Bicarbonate	Maniasic	Good	C2S1
4	Baghsafa	Khoshk	599	Bicarbonate	Clasic	Good	C2S1
5	Bidkal	Maien	526	Bicarbonate	Clasic	Good	C2S1
6	Polekhan	Sivand	2172	Bicarbonate	Sodic	Inappropriate	C3S1
7	Polekhan	Kor	1038	Bicarbonate	Clasic	Good	C3S1
8	Polesaraiten	Saraiten	373	Bicarbonate	Clasic	Good	C2S1
9	Polefasa	Babahaji	7850	Chloride	Sodic	Emergency	C5Sx
10	Tangeboragh	Dozkord	393	Bicarbonate	Clasic	Good	C2S1
11	Tangeboragh	Kor	318	Bicarbonate	Clasic	Good	C2S1
12	Tangebolaghi	Sivand	692	Bicarbonate	Clasic	Good	C2S3
14	Jamalbeig	Shirin	1307	Chloride	Clasic	Apporopriant	C3S2
15	Jamalbeig	Shorkharestan	5626	Chloride	Sodic	Emergency	C4S1
16	Jahanabad Kherameh	Kor	8360	Chloride	Sodic	Emergency	C4S1
17	Jonaki	Kor	468	Bicarbonate	Clasic	Good	C2S1
18	Chambaian	Sivand	1146	Sulphate	Sodic	Good	C3S1
19	Chamriz	Kor	653	Bicarbonate	Clasic	Good	C2S1
20	Chenarsokhte	Nahrazam	598	Bicarbonate	Maniasic	Good	C2S1
21	Chenarsokhte	Khoshk	305	Bicarbonate	Clasic	Good	C2S2
22	Chenarrahdar	Rahdar	2416	Sulphate	Maniasic	Apporopriant	C4S1
23	Chobkhale	Chobkhale	332	Bicarbonate	Clasic	Good	C2S1
24	Hassanabad	Kor	2398	Chloride	Sodic	Inappropriate	C3S1
25	Hosseinabad	Gharejive Spring	417	Bicarbonate	Clasic	Appropriate	C2S1
26	Khanmin	Kor	711	Bicarbonate	Clasic	Good	C2S1
27	Kherameh	Left drainage	10920	Chloride	Sodic	Emergency	C4S1

28	Kherameh	Right Drainage	10998	Cloride	Sodic	Inappropriate	C4S1
29	Khosroshirin	Kor	373	Bicarbonate	Clasic	Good	C2S1
30	Kheirabad	Kor	2074	Cloride	Sodic	Inappropriate	C3S1
31	Dashtbal	Sivand	623	Bicarbonate	Maniasic	Good	C2S1
32	Dehbid	Dehbid	363	Bicarbonate	Clasic	Good	C2S2
33	Dehkadesefid	Gavgodar	382	Bicarbonate	Clasic	Good	C2S1
34	Dehkadesefid	Sefid	370	Bicarbonate	Clasic	Good	C2S2
35	Didgah	Simakan	540	Bicarbonate	Sodic	Good	C2S1
36	Rahmatabad	Sivand	526	Bicarbonate	Clasic	Good	C2S1
37	Drodzandam	Kor	481	Bicarbonate	Clasic	Good	C2S1
38	Shadkam	Sariten	422	Bicarbonate	Clasic	Good	C2S1
39	Shahrak	Tangeshaho	475	Bicarbonate	Clasic	Good	C2S1
40	Zarghamabad	Maien	411	Bicarbonate	Clasic	Good	C2S1
41	Aliabad	Paskohak	1413	Sulphate	Clasic	Apporopriant	C3S1
42	Aliabad	Khoshk	744	Sulphate	Clasic	Good	C2S1
43	Aliabad	Maron	1747	Sulphate	Clasic	Apporopriant	C3S1
44	Emadabad	Sivand	2068	Bicarbonate	Sodic	Inappropriate	C3S1
45	Airport	Mohamadabad	2441	Sulphate	Maniasic	Inappropriate	C4S1
46	Airport	Galedar	880	Bicarbonate	Sodic	Goog	C3S1
47	Ghadamgah	Ghadamgah Spring	263	Bicarbonate	Clasic	Good	C2S1
48	Ghasreghomshe	Spring	498	Bicarbonate	Clasic	Good	C2S1
49	Kaftar	Kaftar lake spring	845	Bicarbonate	Maniasic	Appropriate	C3S1
50	Drodzandam canal	Kor	554	Bicarbonate	Clasic	Good	C2S1
51	Kohsabz	Drainage	4361	Cloride	Sodic	Bad	C4S2
52	Margan	Margan	1256	Cloride	Sodic	Apporopriant	C3S1
53	Margan	Khoshk	1609	Sulphate	Clasic	Apporopriant	C3S1
54	Margan	Gazdan	1766	Sulphate	Clasic	Apporopriant	C3S1
55	Mashhad morghab	Bono Spring	325	Bicarbonate	Clasic	Good	C2S1
56	Menjan	Tangebostanak	279	Bicarbonate	Clasic	Good	C2S1
57	Nasrabad	Kor	368	Bicarbonate	Clasic	Good	C2S4

Table 48: Chemical quality Statistical characteristic in alluvial wells

Plain	Statistical Parameter	Na+	Mg+2	Ca+2	So4-2	Cl-	Hc03 -	PH	EC (µs/cm)	TDS (mg/l)
		Meq/lit								
Tavabee Arsanjan	Maximum	123.8 0	75.00	37.50	0.10	152.50	1.00	9	17624	1044 0
	Minimum	2.00	1.00	1.00	67.50	2.00	10.00	7	741	480
	Average	36.00	12.06	9.00	9.00	44.00	5.00	8	5396	3473
	Standard deviation	32.54	12.00	8.08	9.21	42.48	2.09	0.34 0	4307	2772
	Coefficien t of variation	81.92	40.77	28.87	28.07	80.50	25.08	5.5	69	66
Arsanjan	Maximum	61.30	26.50	48.00	42.82	77.50	9.50	8	8812	5340
	Minimum	0.05	0.36	1.30	0.15	0.85	1.40	7	432	262
	Average	8.22	5.20	6.14	4.28	11.41	4.38	8	1910	1204
	Standard deviation	10.98	5.41	6.49	5.99	14.83	1.61	0.35 2	1764	1127
	Coefficien t of variation	98.33	34.99	36.74	71.06	96.86	30.07	4.9	71	66
Seydan Farough	Maximum	60.80	27.00	25.00	28.00	97.00	30.30	9	11429	6438
	Minimum	0.01	0.12	0.70	0.02	0.30	1.80	7	256	166
	Average	2.40	3.12	3.65	2.13	3.12	4.91	8	964	620
	Standard deviation	4.87	2.49	1.97	2.50	9.02	2.31	0.34 4	1015	496
	Coefficien t of variation	31.73	33.46	4.49	18.58	53.96	76.66	32.3	39	56
Abadetashk Jahanabad	Maximum	538.9 9	205.0 0	90.00	84.86	268.00	7.50	9	62309	1735 0
	Minimum	0.11	0.30	0.70	0.02	0.15	0.85	6	262	175
	Average	26.36	15.07	9.62	7.42	35.65	3.69	7	4345	3175
	Standard deviation	47.39	21.96	11.32	10.75	48.47	1.03	0.49 0	5827	3278
	Coefficien t of variation									

Khanekāt	Maximum	70.00	115.0 0	346.0 0	7.50	391.00	87.50	8	40000	1631 5
	Minimum	1.00	1.00	0.05	2.00	0.25	0.15	7	255	34
	Average	15.01	17.46	30.56	4.43	46.67	13.36	7	5631	3657
	Standard deviation	11.71	19.17	42.77	0.97	52.82	13.18	0.37 6	5162	3063
	Coefficient of variation	55.53	38.94	32.31	76.66	53.96	18.58	4.5	33	32
Khir	Maximum	182.5 0	60.00	70.00	87.50	265.00	7.50	8	19149	1631 5
	Minimum	0.50	1.00	1.85	0.15	0.95	2.00	7	448	34
	Average	30.00	13.48	14.33	12.43	40.67	4.38	7	4990	3649
	Standard deviation	33.36	12.11	10.89	12.62	42.91	0.97	0.406	4160	3015
	Coefficient of variation	83.49	60.94	55.72	54.46	80.55	29.73	2.2	65	65
Estahbān	Maximum	4.50	5.60	9.90	12.30	6.75	4.50	8	1456	940
	Minimum	0.01	0.01	0.20	0.08	0.04	0.15	7	234	189
	Average	0.65	1.15	2.39	1.83	1.50	1.91	7	646	443
	Standard deviation	1.06	1.11	1.74	2.43	1.56	1.36	0.38 1	276	173
	Coefficient of variation	65.61	58.34	44.25	125.1 5	53.57	10.09	1.2	45	46
Neyriz	Maximum	201.2 4	196.0 0	250.0 0	155.0 0	375.00	8.00	8	32990	2314 4
	Minimum	0.02	0.00	1.00	0.07	0.15	0.90	4	328	248
	Average	14.99	20.77	21.44	8.70	46.32	3.49	7	5268	3632
	Standard deviation	21.34	26.14	27.39	12.66	56.38	1.10	3.11 6	5271	3545
	Coefficient of variation	133.4 5	149.8 7	143.5 9	256.7 4	131.44	31.94	5.0	117	114
Tangehāna Pichakan	Maximum	187.50	182.50	117.00	119.11	700.00	7.50	9	35649	17443
	Minimum	0.11	1.20	1.30	1.00	0.55	1.10	6	668	445
	Average	45.59	35.75	26.16	16.58	91.79	3.05	7	9654	6964
	Standard deviation	33.82	27.67	16.06	15.47	55.20	1.01	0.513	4519	2987
	Coefficient	65.85	47.57	46.27	46.99	60.00	28.70	3.2	48	49

	of variation									
Marvdasht Kherameh	Maximum	147.70	103.00	98.00	128.00	235.00	11.00	9	19371	14210
	Minimum	0.01	0.21	0.50	0.04	0.25	1.70	0	78	8
	Average	14.93	11.04	9.31	7.68	24.99	5.27	7	3474	2151
	Standard deviation	24.96	15.73	11.81	12.82	41.01	1.80	0.445	4261	2738
	Coefficient of variation	153.48	141.36	74.81	105.14	160.14	21.25	3.8	129	127
Darian	Maximum	112.50	43.20	32.30	27.50	154.00	7.80	9	18212	10861
	Minimum	0.09	1.00	1.30	0.17	0.45	2.30	7	509	330
	Average	6.68	5.99	5.46	5.31	8.29	4.26	8	1734	1171
	Standard deviation	13.62	6.17	4.08	4.43	15.90	1.12	0.410	1829	1312
	Coefficient of variation	155.10	39.25	37.17	60.52	141.59	16.66	3.7	72	72
Saadatabad	Maximum	9.82	10.90	7.40	8.32	5.50	9.50	9	1778	1269
	Minimum	0.03	0.30	0.20	0.05	0.25	2.50	7	398	267
	Average	2.23	2.88	3.52	2.12	1.78	5.04	8	859	592
	Standard deviation	2.11	1.70	1.11	1.42	1.08	1.54	0.288	318	216
	Coefficient of variation	71.78	53.48	41.85	55.64	68.39	40.20	4.4	46	47
Sarpaniran	Maximum	1.12	1.50	4.50	0.50	2.00	4.30	8	655	380
	Minimum	0.25	0.40	2.50	0.10	0.40	3.10	7	381	220
	Average	0.68	0.75	3.45	0.25	0.76	3.67	8	497	308
	Standard deviation	0.30	0.33	0.61	0.14	0.52	0.41	0.347	77	43
	Coefficient of variation	43.17	44.64	17.67	54.04	68.62	11.17	4.3	16	14
Ghaderabad Madarsoliman	Maximum	6.55	8.70	9.00	7.90	5.00	8.50	9	1640	1147
	Minimum	0.02	0.20	0.50	0.05	0.15	2.00	6	4	127
	Average	1.79	2.78	3.12	2.29	1.70	4.41	8	814	534
	Standard deviation	1.52	1.85	1.16	1.90	1.29	1.24	0.327	344	231
	Coefficient of variation	67.04	61.41	36.87	85.96	63.93	23.30	2.0	41	41

	variation									
Dehbid	Maximum	43.50	20.00	15.00	35.86	38.00	28.00	9	6437	4036
	Minimum	0.01	0.20	0.20	0.05	0.05	1.90	6	170	107
	Average	2.38	2.77	3.24	2.17	2.62	4.15	8	850	553
	Standard deviation	4.01	3.03	2.37	3.40	4.12	2.41	0.48 2	731	482
	Coefficient of variation	168.8 8	105.7 6	50.33	150.1 7	124.56	54.36	3.8	89	83
Namdan	Maximum	41.20	35.00	20.00	35.50	47.50	8.00	9	7196	5282
	Minimum	0.01	0.10	0.10	0.01	0.15	2.00	6	188	112
	Average	0.95	1.45	2.69	0.94	1.35	3.43	7	535	370
	Standard deviation	3.29	3.05	1.67	2.99	4.40	0.81	0.43 0	650	437
	Coefficient of variation	133.3 9	73.76	25.26	177.7 7	112.85	28.21	3.6	54	57
Beiza-Zarghan	Maximum	110.0 0	99.00	52.00	100.0 0	500.00	13.00	9	42708	2640 0
	Minimum	0.04	0.45	1.00	0.08	0.30	2.00	7	385	10
	Average	10.79	10.83	8.06	7.94	19.30	5.89	8	2973	1918
	Standard deviation	19.23	14.08	8.41	12.57	43.21	1.76	0.32 2	4096	2549
	Coefficient of variation	148.3 5	101.9 3	93.88	187.9 3	131.13	32.36	3.5	93	89
Dozkord Komphirouz	Maximum	2.60	3.50	4.50	1.65	3.50	5.40	8	888	612
	Minimum	0.01	0.10	1.80	0.03	0.20	2.20	7	251	165
	Average	0.41	1.29	2.93	0.30	0.66	3.78	8	441	303
	Standard deviation	0.62	0.80	0.66	0.38	0.85	0.84	0.27 1	151	103
	Coefficient of variation	123.0 8	47.49	19.06	93.60	87.23	15.82	2.9	33	30
Khosroshirin	Maximum	2.52	1.00	4.00	0.40	2.50	4.10	7.8	743	451
	Minimum	0.13	0.40	2.50	0.10	0.20	2.70	7.1	316	203
	Average	0.48	0.61	3.21	0.14	0.52	3.60	7.6	422	279
	Standard deviation	0.69	0.22	0.44	0.09	0.67	0.52	0.3	120	68

	Coefficient of variation	135.95	38.33	13.40	78.98	131.03	14.54	4.0	30	26
Asopas	Maximum	53.33	27.50	17.50	17.18	75.00	6.30	8.3	9373	5970
	Minimum	0.01	0.10	0.20	0.02	0.10	0.95	0.7	118	81
	Average	0.71	0.81	2.54	0.52	1.18	3.18	7.3	408	304
	Standard deviation	4.00	1.80	1.42	1.17	4.65	0.68	0.5	530	402
	Coefficient of variation	64.32	56.46	13.96	84.54	70.72	12.45	3.2	24	23
Bakan	Maximum	0.21	1.40	3.90	0.55	0.10	4.20	8.2	440	276
	Minimum	0.07	0.20	1.70	0.10	0.04	1.70	7.2	200	117
	Average	0.10	0.59	2.87	0.25	0.08	3.23	7.5	351	210
	Standard deviation	0.03	0.30	0.48	0.12	0.02	0.62	0.3	57	41
	Coefficient of variation	92.77	75.71	21.19	59.77	47.51	28.28	2.9	27	27
Shiraz	Maximum	92.50	67.50	30.00	89.00	105.00	11.00	8.5	13780	11040
	Minimum	0.01	0.20	0.50	0.02	0.15	2.10	6.6	238	15
	Average	4.94	8.49	8.26	10.48	6.46	5.11	7.4	1858	1369
	Standard deviation	8.56	8.99	6.02	12.64	10.12	1.61	0.4	1569	1303
	Coefficient of variation	105.14	63.73	48.04	91.18	99.42	18.66	3.2	62	59
Gareebagh	Maximum	350.00	162.00	50.00	140.00	62.00	8.50	8.4	63740	94400
	Minimum	0.07	1.34	2.00	0.10	0.40	2.10	6.6	483	324
	Average	11.49	9.74	8.62	13.39	5.91	4.62	7.5	2499	2896
	Standard deviation	42.33	19.97	8.36	21.21	8.77	1.38	0.4	6474	11384
	Coefficient of variation	66.14	49.92	37.53	60.03	58.38	22.45	2.9	41	42
Kavar Maharlu	Maximum	44.80	42.50	28.00	70.00	34.00	6.50	8.4	6707	6259
	Minimum	0.02	0.60	1.50	0.12	0.30	0.44	6.7	440	289
	Average	4.63	10.46	9.70	15.05	5.10	4.50	7.5	2098	1568

	Standard deviation	6.67	8.63	6.25	13.99	6.73	0.88	0.3	1492	1192
	Coefficient of variation	138.45	75.93	59.40	85.22	131.90	7.46	3.7	76	83
Sarvestan	Maximum	943.00	387.50	130.00	220.00	1,050.00	7.50	8.5	70144	53044
	Minimum	0.50	0.60	2.50	0.11	0.50	1.60	5.5	550	410
	Average	70.52	28.17	21.56	30.72	86.11	3.92	7.5	9290	5879
	Standard deviation	159.47	40.36	17.38	31.81	168.73	1.13	0.4	12397	8720
	Coefficient of variation	83.89	47.63	40.01	55.85	83.45	25.97	2.7	60	57
Ghoshnegan	Maximum	70.00	29.00	20.00	11.75	107.00	6.00	8.4	10869	6883
	Minimum	9.50	5.50	5.00	2.96	15.00	2.50	7.1	2510	1620
	Average	32.90	16.45	11.75	7.53	50.45	3.56	7.8	5963	3715
	Standard deviation	20.60	8.80	5.11	3.01	32.50	1.02	0.5	3058	1866
	Coefficient of variation	66.14	48.83	46.52	39.51	66.39	31.09	6.4	53	52

Table 49: Relationship between EC and other ions

Plain	Type	Correlation Coefficient	Relationship
Tavabee Arsanjan (6)	Chloride (6)	0.5258	$\text{Na}=0.0049\text{Ec}+14.03$
		0.6722	$\text{Mg}=0.0038\text{Ec}-11.715$
		0.95	$\text{Cl}=0.01\text{Ec}-8.7893$
		0.97	$\text{TDS}=0.6217\text{Ec}+218.11$
Arsanjan (9)	Chloride (6)	0.94	$\text{Na}=0.005\text{Ec}-0.499$
		0.94	$\text{Mg}=0.0031\text{Ec}-0.1713$
		0.98	$\text{Cl}=0.0094\text{Ec}-60698$
		0.99	$\text{TDS}=0.6032\text{Ec}+88.816$
	Bicarbonate(3)	-	Without relationship
Seydan-Farough (19)	Bicarbonate (18)	0.51	$\text{Na}=0.0039\text{Ec}-0.5992$
		0.59	$\text{Ca}=0.0049\text{Ec}-1.0762$
		0.72	$\text{Cl}=0.0036\text{Ec}-1.323$
		0.78	$\text{TDS}=0.5407\text{Ec}+144.23$
	Cholride (1)	-	Without relationship
Abade Tashk Jahanabad (23)	Bicarbonate (7)	0.86	$\text{Cl}=0.0055\text{Ec}-1.8584$
		0.9609	$\text{TDS}=0.6005\text{Ec}+41.407$
	Chloride (13)	0.8601	$\text{Na}=0.0054\text{Ec}-5.2574$
		0.87	$\text{Mg}=0.0045\text{Ec}-2.7564$
		0.81	$\text{SO}_4=0.002\text{Ec}-0.8827$
		0.9773	$\text{Cl}=0.0097\text{Ec}-6.6494$
		0.99	$\text{TDS}=0.6898\text{Ec}-128.09$
	Solphate(3)		
Khanekat (4)	Chloride (4)	0.98	$\text{Na}=0.1332\text{Ec}-157.59$
		0.95	$\text{Mg}=0.0257\text{Ec}+56.099$
		0.95	$\text{Ca}=0.0405\text{Ec}+76.363$
		0.99	$\text{Cl}=0.1492\text{Ec}-190.25$
		0.99	$\text{TDS}=0.5641\text{Ec}+398.25$
Kheir (14)	Chloride (10)	0.67	$\text{Ca}=0.002\text{Ec}+2.7182$
		0.79	$\text{Cl}=0.0058\text{Ec}+16.713$

		0.997	TDS=0.6175Ec+234.93
	Bicarbonate(2)	-	Without relationship
	Sulphate(2)	-	Without relationship
Estahban (9)	Bicarbonate (5)	0.56	Na=0.0031Ec-1.0707
		0.74	Mg=0.0066Ec-1.7454
		0.97	Cl=0.0024Ec-0.5878
		0.996	TDS=0.6773Ec-0.0153
	Sulphate(4)	0.65	Ca=0.0045Ec-0.0296
		1.00	Cl=0.0045Ec-3.2188
		0.96	TDC=0.6936Ec-13.974
Neyriz (36)	Bicarbonate (8)	0.68	Na=0.0052Ec-1.2989
		0.67	Cl=0.0031Ec-0.597
		0.67	HCO3=0.0038Ec+1.5678
		0.98	TDS=0.6428Ec+25.915
	Choloride (21)	0.96	Na=0.0048Ec 8.805
		0.68	Mg=0.0041Ec-9.139
		0.68	Ca=0.0029Ec+9.964
		0.96	Cl=0.0108Ec-24.748
		0.99	TDS=0.6436Ec+74.603
	Sulphate (7)	0.94	Na=0.0065Ec-3.3273
		0.97	Mg=0.0025Ec-0.3905
		0.86	Ca=0.0022Ec+3.1551
		0.95	SO4=0.0069Ec-2.6546
		0.91	Cl=0.0039Ec-0.9091
		0.99	TDS=0.6649Ec+38.443
Tangehana- Pichakan (27)	Chloride (25)	0.69	Na=0.0062Ec-4.596
		0.91	Cl=0.0099Ec-8.1682
		0.97	TDS=0.7026Ec-2.88
	Solphate (2)	-	Without relationship
Dehbid (21)	Bicarbonatr (14)	0.82	Na=0019Ec-0.0209
		0.99	Mg=0063Ec-1.7379
		0.78	Ca=0.0017Ec+1.8825
		0.94	Cl=0.0028Ec-0.5663

		0.98	$\text{HCO}_3=0.0065\text{Ec}+0.1674$
		0.99	$\text{TDS}=0.6118\text{Ec}+27.009$
	Chloride(2)	-	Without relationship
	Sulphate(5)	0.88	$\text{Mg}=0.0032\text{Ec}-0.0366$
		0.81	$\text{Ca}=0.0057\text{Ec}-2.4262$
		0.89	$\text{Cl}=0.0032\text{Ec}-0.6143$
		0.99	$\text{TDS}=0.6449\text{Ec}+32.896$
		-	Without relationship
Namdam (37)	Bicarbonate (35)	0.91	$\text{Mg}=0.0067\text{Ec}-2.1001$
		0.73	$\text{SO}_4=0.004\text{Ec}-0.7737$
		0.75	$\text{Cl}=0.0039\text{Ec}-1.2128$
		0.98	$\text{TDS}=0.6369\text{Ec}-19.383$
	Chloride(2)	-	Without relationship
Beiza-Zarghan (28)	Bicarbonate (9)	0.94	$\text{Na}=0.012\text{Ec}-8.907$
		0.58	$\text{So}_4=0.0027\text{Ec}-0.0539$
		0.65	$\text{Cl}=0.0036\text{Ec}-0.5311$
		0.93	$\text{HCO}_3=0.0051\text{Ec}+0.3049$
		0.94	$\text{TDS}=0.6927\text{Ec}-37.46$
	Chloride (14)	0.75	$\text{Ca}=0.0016\text{Ec}+3.8885$
		0.68	$\text{Mg}=0.031\text{Ec}+2.82$
		0.96	$\text{Cl}=0.01\text{Ec}-13.496$
		0.99	$\text{TDS}=0.6458\text{Ec}+38.194$
	Solphate (3)	0.91	$\text{Mg}=0.0067\text{Ec}-2.1001$
		0.98	$\text{TDS}=0.6369\text{Ec}+19.383$
		0.73	$\text{SO}_4=0.004\text{Ec}-0.7737$
		0.75	$\text{Cl}=0.0039\text{Ec}-1.2128$
Dozkord Kamphirouz (13)	Bicarbonate (13)	0.99	$\text{TDS}=0.6315\text{Ec}+33.3$
		0.93	$\text{Cl}=0.0059\text{Ec}-1.92$
		0.94	$\text{SO}_4=0.0009\text{Ec}-0.19$
		0.85	$\text{Mg}=0.0039\text{Ec}-0.39$
		0.88	$\text{Na}=0.0044\text{Ec}-1.7$
Khosroshirin (6)	Bicarbonate (6)	0.8	$\text{K}=0.0001\text{Ec}-0.02$
		0.96	$\text{Na}=0.0061\text{Ec}-2.2$

		0.88	Ca=0.0028Ec+2.1
		0.9	SO4=0.0008Ec-0.21
		0.95	Cl=0.006Ec-2.1
		0.99	TDS=0.558EC+43.02
Asopas (35)	Bicarbonate (32)	0.63	Na=0.0052Ec-0.1519
		0.95	TDS=0.6647EC+4.9179
	Chloride(3)	-	Without relationship
Bakan (34)	Bicarbonate (34)	0.896	HCO3=0.0085Ec-0.12
		0.95	TDS=0.67663Ec+8.6
Shiraz (16)	Bicarbonate (9)	0.95	Mg=0.0073Ec-2.4233
		0.98	SO4=0.0033Ec-0.7165
		0.76	Cl=0.00442Ec-2.134
		0.99	TDS=0.6454Ec+15.885
	Sulphate (5)	0.88	Ca=0.0039Ec+1.761
		0.96	Cl=0.0042Ec-2.644
		0.99	TDS=0.6648Ec+31.378
	Chloride(2)	-	Without relationship
Ghareebagh (10)	Bicarbonate (2)	-	Without relationship
	Sulphate(7)	0.89	Mg=0.00784Ec-8.68
		0.92	SO4=0.009Ec-5.5676
		0.94	Cl=0.0962Ec-30.512
		0.99	TDS=0.6436Ec+26.448
	Chloride(3)	-	Without relationship
Kavar Maharlu (11)	Sulphate (9)	0.73	Na=0.003Ec-2.9827
		0.82	Mg=0.0054Ec+0.6523
		0.77	SO4=0.0065Ec+0.5688
		0.73	Cl=0.0044Ec-4.6435
		0.98	TDS=0.6549Ec+99.247
	Bicarbonate	-	Without relationship
Sarvestan (29)	Chloride (23)	0.81	Mg=0.0025Ec+13.433
		0.93	Cl=0.3472Ec+754.51

		0.64	$\text{HCO}_3=0.0001\text{Ec}+2.99$
		0.97	$\text{TDS}=0.7217\text{Ec}-536.52$
	Sulphate (4)	0.97	$\text{Mg}=0.039\text{Ec}+11.132$
		0.97	$\text{SO}_4=0.2499\text{Ec}+66.676$
		0.97	$\text{Cl}=0.1898\text{Ec}-186.77$
		0.99	$\text{TDS}=0.6122\text{Ec}+121.22$
	Bicarbonate(2)	-	Without relationship
Goshnegan (8)	Chloride (8)	0.98	$\text{Na}=0.1538\text{Ec}-172.27$
		0.92	$\text{Mg}=0.0295\text{Ec}-34.633$
		0.93	$\text{Ca}=0.0311\text{Ec}+47.59$
		0.99	$\text{Cl}=0.3753\text{Ec}-450.27$
		1	$\text{TDS}=0.6079\text{Ec}+97.111$

Table 50: Rainfall of heights and plains

Column	Study area	Code	Area (Cubic Kilometer)			Distance – plain aquifer	Average rainfall(mm)	
			Height	Plain	Aquifer		Plain	Height
1	Tavabee Arsanjan	4301	64.40	210.60	148.90	61.7	265.4	297.2
2	Arsanjan	4302	595.90	283.10	117.10	166.0	311.0	353.0
3	Seydan – Farough	4303	196.70	172.30	147.20	25.1	352.6	405.6
4	South tashk lake	4304	110.50	52.50	1.00	51.5	284.7	307.8
5	Abadetashk - Jahanabad	4305	625.80	894.40	391.70	502.7	226.5	295.1
6	Khanekate	4306	186.40	196.60	101.20	95.4	265.6	322.9
7	Kheir	4307	84.50	144.50	93.10	51.4	265.2	310.3
8	Estahban	4308	259.50	157.50	51.80	105.7	285.7	310.3
9	Neyriz	4309	388.70	630.30	256.30	374.0	178.0	227.0
10	Tangehana-Pichakan	4310	555.30	785.40	185.70	599.7	230.0	249.9
11	Marvdasht - Khrameh	4311	1488.50	2452.50	2031.40	421.1	362.7	445.2
12	Darian	4312	140.80	193.20	133.00	60.2	345.3	390.2
13	Saadatabad	4313	525.50	197.50	150.60	46.9	371.8	410.0
14	Sarpaniran	4314	267.50	178.50	94.40	84.1	336.3	317.9
15	Ghaderabd - Madarsoliman	4315	1220.70	1687.30	874.80	812.5	335.7	345.6
16	Dehbid	4316	537.50	1352.50	941.80	410.7	261.0	314.9
17	Namdan	4317	957.40	1799.20	1317.00	482.2	298.8	313.0
18	Beiza – Zarghan	4318	722.30	1015.70	905.40	110.3	408.2	488.8
19	Khosroshirin	4319	17770.50	266.80	146.30	120.5	515.4	685.0
20	Khosroshirin	4320	286.80	338.20	186.30	151.9	382.3	404.1
21	Asopas	4321	752.60	870.40	716.20	154.2	471.3	436.3
22	Bakan	4322	192.50	151.50	144.80	6.7	440.0	489.0
23	Shiraz	4323	829.40	598.60	444.20	154.4	362.5	424.5
24	Gharebagh	4324	223.50	229.50	202.40	27.1	288.5	367.1
25	Kavar Maharlu	4325	175.90	147.10	131.50	15.6	381.1	420.9
26	Sarvestan	4326	573.40	1067.60	639.00	428.6	279.8	349.2
27	Goshnegan	4327	124.70	58.50	13.80	44.7	262.8	300.8
	Sum of basin		13864.2	16131.8	10566.9	5564.9	-	-

Table 51: Hydro climatology balance parameters

Column	Study area	Area	Rainfall percentage	Runoff percentage	Evapotranspiration percentage	Column	Study area	Area	Rainfall percentage	Runoff percentage	Evapotranspiration percentage
1	Tavabee Arsanjan	Height	15.01	7.41	77.58	15	Ghaderabd Madarsoli man	Height	33.15	5.07	61.78
		Plain	16.36	1.81	81.83			Plain	25.84	3.78	70.38
2	Arsanjan	Height	35.19	7.01	57.08	16	Dehbid	Height	37.74	5.56	56.70
		Plain	14.03	18.45	67.52			Plain	31.10	5.56	63.34
3	Seydan – Farough	Height	37.62	10.38	52.00	17	Namdan	Height	48.03	6.73	45.24
		Plain	36.63	7.29	56.08			Plain	39.42	6.81	53.77
4	South Tashk lake	Height	13.19	14.67	72.14	18	Beiza-Zarghan	Height	39.79	10.21	50.00
		Plain	12.90	7.41	79.69			Plain	40.92	7.08	52.00
5	Abadadeta shk-jahanabad	Height	31.38	13.41	55.21	19	Dozkord Kamphiroz	Height	28.90	26.46	44.64
		Plain	20.69	10.75	68.56			Plain	38.17	6.47	55.36
6	Khanekate	Height	22.48	18.00	59.52	20	Khosroshirin	Height	49.07	12.26	38.67
		Plain	9.00	12.00	79.00			Plain	44.07	8.35	47.58
7	Kheir	Height	25.79	17.88	56.33	21	Asopas	Height	40.85	8.29	50.86
		Plain	25.58	10.36	64.07			Plain	34.44	7.49	58.07
8	Estahban	Height	19.33	17.10	63.57	22	Bakan	Height	39.06	10.18	50.76
		Plain	8.90	18.33	72.77			Plain	29.02	7.06	63.92
9	Neyriz	Height	4.02	11.97	84.01	23	Shiraz	Height	17.23	20.00	62.77
		Plain	4.48	5.91	89.39			Plain	14.82	6.07	79.11
10	Tangehana – Pichakan	Height	4.55	10.58	84.87	24	Gharebagh	Height	26.79	11.02	62.19
		Plain	2.49	7.87	89.64			Plain	12.21	10.42	77.37
11	Marvdasht – Kherameh	Height	4.26	14.62	45.12	25	Kavar Maharlu	Height	33.94	6.36	59.10
		Plain	38.38	5.78	55.84			Plain	18.46	6.96	74.56
12	Darian	Height	32.05	17.93	50.02	26	Sarvestan	Height	28.70	9.49	61.81
		Plain	16.20	22.58	61.22			Plain	12.65	7.31	80.04

13	Saadatabad	Height	42.69	5.28	52.03	27	Goshnegan	Height	21.94	9.46	68.60
		Plain	35.63	2.86	61.51			Plain	10.03	8.19	87.78
14	Sarpaniran	Height	22.59	10.05	66.91	28	Total basin	Height	29.69	11.75	58.56
		Plain	17.93	16.80	65.27			Plain	22.67	8.60	68.73

Table 52: Hydro climatology balance of plains and heights (MCM/ year)

	Area	Area(square Kilometer)	Rainfall volume	Actual Evapotranspiration	Useful rainfall			Evaporation from lake
					Surface flow	Infiltration	Sum	
Tavadee Arsanjan	height	64.40	62.60	51.44	6.18	5.05	184.61	-
	Plain	210.60	17.08	13.27	0.84	2.97	241.79	-
	Sum	275.00	79.68	64.71	7.01	8.02	426.40	-
Arsanjan	height	595.90	210.35	121.86	14.60	73.89	942.71	-
	Plain	283.10	88.07	59.48	16.20	12.39	446.85	-
	Sum	879.00	298.42	181.34	30.80	86.28	1389.59	-
Seydan-Farough	height	196.70	79.78	41.46	8.30	30.01	326.25	-
	Plain	172.30	60.75	34.15	4.33	22.27	271.53	-
	Sum	369.00	140.54	75.61	12.63	52.28	597.78	-
South Tashk Lake	height	110.50	34.01	24.95	4.69	4.37	174.15	-
	Plain	52.50	14.95	12.04	1.10	1.72	80.59	-
	Sum	163.00	48.96	36.99	5.79	6.09	254.74	-
Abadetashk-Jahanabad	height	625.80	184.67	101.25	24.77	58.66	936.50	-
	Plain	894.40	202.58	138.98	21.70	41.90	1257.66	-
	Lake	416.80	94.41	-	-	-	511.21	94.41
	Sum	1937.00	481.66	240.23	46.47	100.56	2705.36	94.41
Kh	height	186.40	60.18	39.00	10.83	10.36	296.41	-

	Plain	196.60	52.22	41.27	6.25	4.70	296.34	-
	Sum	383.00	112.40	80.26	17.09	15.06	592.75	-
Kheir	height	84.50	22.41	12.62	4.01	5.78	123.53	-
	Plain	144.50	44.82	28.74	4.62	11.46	222.69	-
	Sum	229.00	67.23	41.36	8.63	17.24	346.22	-

	Area	Area(square Kilometer)	Rainfall volume	Actual Evapotranspiration	Useful rainfall			Evaporation from lake
					Surface flow	Infiltration	Sum	
Estahban	height	259.50	80.53	51.18	13.80	15.56	405.01	-
	Plain	157.50	45.00	32.74	8.25	4.00	243.50	-
	Sum	417.00	125.53	83.92	22.05	19.56	648.50	-
Neyriz	height	388.70	88.23	74.12	10.56	3.55	561.61	-
	Plain	630.30	112.20	100.29	6.89	5.03	849.67	-
	Sum	1019.00	200.43	174.41	17.45	8.57	1411.28	-
Tangehana-Pichakan	height	555.30	138.77	117.78	14.81	6.18	826.66	-
	Plain	785.40	180.64	161.95	14.21	4.48	1142.20	-
	lake	739.30	170.04	-	-	-	-	170.04
	Sum	2080.00	489.45	279.73	29.03	10.65	1968.86	170.04
Marvdasht-Kherameh	height	1488.50	662.68	299.00	96.88	266.80	2547.06	-
	Plain	2452.50	889.34	496.58	51.40	341.36	3889.82	-
	Sum	3941.00	1552.02	795.58	148.28	608.16	6436.88	-
Darian	height	140.80	54.94	27.50	9.84	17.60	233.08	-
	Plain	193.20	66.71	40.84	15.06	10.81	315.82	-
	Sum	334.00	121.65	68.34	24.91	28.40	548.90	-
Saadatadad	height	525.50	215.46	112.10	11.39	91.98	864.44	-
	Plain	197.50	73.43	45.19	2.10	26.14	318.22	-
	Sum	723.00	288.89	157.29	13.49	118.12	1182.66	-

Sarpaniran	height	267.50	89.96	58.72	15.11	16.12	431.30	-
	Plain	178.50	56.75	37.97	5.96	12.82	279.17	-
	Sum	446.00	146.71	96.69	21.07	28.94	710.47	-

	Area	Area(square Kilometer)	Rainfall volume	Actual Evapotranspiration	Useful rainfall			Evaporation from lake
					Surface flow	Infiltration	Sum	
Ghadeabad-Madarsolimar	height	1220.70	421.87	260.68	21.34	139.85	1924.59	-
	Plain	1687.30	566.43	404.12	21.95	140.37	2679.80	-
	Sum	2908.00	988.30	64.80	43.29	280.22	4604.39	-
Dehbid	height	537.50	169.25	105.11	9.41	54.73	821.27	-
	Plain	1352.50	353.01	226.49	19.62	105.91	1951.62	-
	Sum	1890.00	522.26	331.60	29.03	160.63	2772.89	-
Namdan	height	957.40	299.64	152.73	20.17	126.74	1429.93	-
	Plain	1799.20	537.60	307.83	36.61	193.16	2681.24	-
	Lake	46.40	13.86	-	-	-		13.86
	Sum	2803.00	851.10	460.56	56.78	319.90	4111.18	13.86
Beiza-Zarghan	height	722.30	353.05	187.03	35.55	130.48	1297.93	-
	Plain	1015.70	414.64	215.60	29.36	169.67	1675.30	-
	Sum	1738.00	767.69	402.63	64.90	300.15	2973.23	-
Dozkord-Kamphirouz	height	1777.50	916.12	543.45	59.27	313.39	3296.35	-
	Plain	266.80	182.76	74.64	51.36	56.82	575.56	-
	Lake	49.70	25.62	-	-	-	-	25.62
	Sum	2094.00	1124.50	618.10	110.63	370.20	3871.91	25.62
Khosroshirin	height	286.80	115.90	44.82	14.21	56.87	461.72	-
	Plain	338.20	129.29	61.52	10.77	56.98	539.78	-
	Sum	625.00	245.19	106.34	24.98	113.85	1001.50	-

Asopas	height	752.60	328.26	167.00	27.22	134.05	1275.08	-
	Plain	870.40	410.22	238.21	30.73	141.28	1549.56	-
	Sum	1623.00	738.48	405.21	57.95	275.33	2824.64	-

	Area	Area(square Kilometer)	Rainfall volume	Actual Evapotranspiration	Useful rainfall			Evaporation from lake
					Surface flow	Infiltration	Sum	
Bakan	height	192.50	66.66	42.65	4.71	19.30	306.52	-
	Plain	151.50	94.13	57.18	9.58	27.32	312.39	-
	Sum	344.00	160.79	99.83	14.29	46.62	618.91	-
Shiraz	height	829.40	352.08	221.00	70.42	60.66	131.08	-
	Plain	598.60	216.99	171.66	13.17	32.16	45.33	-
	Sum	1428.00	569.07	392.66	83.59	92.82	176.41	-
Gharebagh	height	233.50	82.05	50.85	9.05	22.08	365.45	-
	Plain	229.50	66.21	51.09	6.90	8.18	353.70	-
	Sum	453.00	148.26	101.94	15.95	30.26	719.15	-
Kavar Maharlu	height	175.90	67.04	47.48	7.17	12.39	297.59	-
	Plain	147.10	61.91	36.59	4.31	21.01	249.91	-
	Sum	323.00	128.95	84.07	11.48	33.40	547.50	-
Sarvestan	height	573.40	160.44	99.17	15.23	46.05	848.23	-
	Plain	1067.60	372.81	298.39	27.25	46.16	1766.05	-
	Sum	1641.00	533.24	397.56	42.48	93.21	2614.28	-
Goshnegan	height	124.70	37.51	25.54	3.55	8.23	191.30	-
	Plain	58.50	15.29	12.51	1.25	1.58	87.55	-
	Lake	243.80	64.07	-	-	-	-	64.07
	Sum	427.00	116.87	38.05	4.80	9.81	278.85	64.07

Table 53: Alluvial aquifer balance

Column	Study area	Area (km) ¹	Recharge						Discharge					
			Groundwater flow	Rainfall	Surface water	Agriculture	Drinking & industry	Total recharge	Discharge (Wells, Springs)	Drainage	Aquifer evaporation	Groundwater output	Total discharge	Changes reserves
1	Tavabee Arsanjan	148.90	29.57	8.14	5.15	15.50	1.19	59.55	79.04	-	0.00	0.42	79.46	-19.91
2	Arsanjan	117.10	30.04	5.12	9.27	30.10	0.77	75.66	126.10	-	-	4.69	130.79	-55.13
3	Seidan - Faough	147.20	59.47	19.03	1.91	48.19	8.98	137.57	198.50	-	0.74	7.09	206.33	-68.76
4	South Tashk lake	1.00	4.26	0.03	0.31	0.00	0.00	4.58	0.02	-	0.30	4.26	4.58	0.00
5	Abade Tashk Jahanabad	391.70	15.89	18.35	6.95	26.51	6.68	74.37	138.16	-	-	-	138.16	-53.79
6	Khanekhat	101.20	15.08	2.42	1.80	6.44	0.96	26.71	30.15	-	-	6.72	36.87	-10.16
7	Khair	93.10	11.20	7.80	1.34	5.53	0.92	26.80	32.59	-	-	1.71	34.30	-7.50
8	Estahban	51.80	0.30	1.32	2.75	7.18	1.44	12.99	37.83	-	-	0.20	38.03	-25.05
9	Neyriz	256.30	12.15	2.04	2.18	8.39	1.69	26.45	52.94	-	-	-	52.94	-26.49
10	Tangehna - Pichakan	185.70	22.26	1.06	2.02	4.43	1.54	31.31	32.05	-	-	11.94	43.99	-12.68
11	Marvdasht - Kherameh	2031.40	195.35	282.78	63.89	292.20	64.35	898.57	866.22	33.12	33.37	3.67	936.38	-37.81
12	Darian	133.00	10.31	7.44	2.26	23.00	1.23	95.80	95.80	-	-	0.18	95.98	-51.75
13	Saadatabad	150.60	98.80	19.95	31.03	63.53	5.67	218.08	202.08	32.03	-	-	234.11	-15.13

Table 54: Input and output groundwater flow with Darcy's law

Section number	L(m)	W(m)	Heights difference (m)	Hydrolic slope (%)	T(m ² /day)	(day)	Flow volume (MCM)
1	2310	1160	5	0.43	1300	365	4.725
2	1560	930	5	0.54	1300	365	3.980
3	4240	1760	5	0.28	500	365	2.20
4	4760	1010	5	0.50	200	365	1.72
5	6310	2470	5	0.20	100	365	0.47
Input flow (Cubic mllion meters /year)							13.09

Section number	L(m)	W(m)	Heights difference (m)	Hydrolic slope (%)	T(m ² /day)	(day)	Volume of flow. (MCM)
1	3954	971	5	0.01	50	365	0.37
2	34670	960	5	0.01	50	365	3.30
output flow (Cubic mllion meters /year)							3.67

Table 55: Water consumption

Total consumption	Hardrock formation				Alluvial				Consumption	Plain
	Sum	Spring surface water	Qanat	Well	Sum	Spring surface water	Qanat	Well		
77.48	0.00	0.00	0.00	0.00	77.48	0.02	0.00	77.46	Agriculture	Tavabee Arsanjan
1.20	0.00	0.00	0.00	0.00	1.20	0.00	0.00	1.20	Drinking	
0.40	0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.40	Industry	
136.79	15.76	0.13	3.63	12.01	121.03	3.62	0.84	116.57	Agriculture	Arsanjan
4.28	0.50	0.01	0.12	0.38	3.78	0.11	0.03	3.64	Drinking	
1.42	0.16	0.00	0.04	0.13	1.26	0.04	0.01	1.21	Industry	
208.43	15.66	0.27	3.57	11.82	192.77	16.30	16.55	159.92	Agriculture	Seidan-Farough
11.03	0.83	0.01	0.19	0.63	10.22	0.86	0.88	8.46	Drinking	
1.11	0.08	0.00	0.02	0.06	1.03	0.09	0.09	0.85	Industry	
0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	Agriculture	South Tashk lak
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Drinking	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	Industry	
163.12	35.71	23.67	0.56	11.48	127.41	3.46	0.20	123.75	Agriculture	Abade Tashk jahanabad
12.89	0.20	0.12	0.02	0.06	12.69	2.84	5.34	4.51	Drinking	
1.96	1.16	0.74	0.00	0.42	0.80	0.13	0.03	0.65	Industry	
30.44	2.83	0.00	0.00	2.83	27.61	0.04	1.42	26.14	Agriculture	Khanekat
5.89	0.42	0.00	0.39	0.03	5.47	4.64	0.02	0.82	Drinking	
0.51	0.18	0.00	0.00	0.18	0.33	0.01	0.04	0.27	Industry	
27.74	0.09	0.00	0.00	0.09	27.66	0.00	0.00	27.66	Agriculture	Khir
3.71	2.85	0.09	0.00	2.76	0.86	0.00	0.00	0.86	Drinking	
1.15	0.86	0.00	0.00	0.86	0.29	0.00	0.00	0.29	Industry	
42.16	10.44	0.12	0.00	10.33	31.72	13.39	0.22	18.10	Agriculture	Estahban
12.70	7.34	5.47	0.00	1.87	5.36	2.05	0.04	3.27	Drinking	
1.12	0.37	0.12	0.00	0.25	0.76	0.32	0.01	0.44	Industry	

Total consumption	Hardrock formation				Alluvial				Consumption	Plain
	Sum	Spring surface water	Qanat	Well	Sum	Spring surface water	Qanat	Well		
55.48	8.90	0.76	0.67	7.47	46.59	2.88	5.19	38.52	Agriculture	Neyriz
6.31	1.01	0.09	0.08	0.85	5.29	0.33	0.59	4.38	Drinking	
1.26	0.20	0.02	0.02	0.17	1.06	0.07	0.12	0.88	Industry	
32.32	2.20	0.04	0.01	2.14	30.13	0.00	0.03	30.10	Agriculture	Tangehan-Pichakan
1.37	0.09	0.00	0.00	0.09	1.28	0.00	0.00	1.28	Drinking	
0.69	0.05	0.00	0.00	0.05	0.64	0.00	0.00	0.64	Industry	
1207.08	83.22	24.02	4.18	55.02	1123.86	319.56	0.12	804.18	Agriculture	Marvadasht-Kheramh
28.53	2.55	0.75	0.13	1.67	25.99	0.85	0.00	25.13	Drinking	
9.85	1.19	0.22	0.45	0.52	8.66	0.28	0.00	8.38	Industry	
43.03	32.03	24.34	0.68	7.01	11.00	0.61	0.61	9.79	Agriculture	Darian
3.92	1.04	0.76	0.02	0.26	2.88	0.02	0.02	2.84	Drinking	
1.29	0.33	0.25	0.01	0.07	0.96	0.01	0.01	0.95	Industry	
248.36	14.22	0.66	0.00	13.56	234.14	71.29	4.51	158.34	Agriculture	Saadatabad
5.86	0.47	0.02	0.00	0.45	5.38	0.29	0.14	4.95	Drinking	
1.85	0.15	0.01	0.00	0.14	1.71	0.01	0.05	1.65	Industry	
57.79	0.00	0.00	0.00	0.00	57.79	2.29	18.62	36.25	Agriculture	Sarpaniran
0.87	0.00	0.00	0.00	0.00	0.87	0.09	0.27	0.51	Drinking	
0.29	0.00	0.00	0.00	0.00	0.29	0.03	0.09	0.17	Industry	
345.33	67.47	18.32	9.01	40.14	277.87	109.53	100.48	67.86	Agriculture	Ghaderabad Madarsoliman
7.03	2.75	1.23	0.27	1.25	4.27	1.23	1.58	1.47	Drinking	
2.35	0.92	0.41	0.09	0.42	1.43	0.41	0.53	0.50	Industry	
236.23	5.87	2.32	2.96	0.60	230.36	96.41	51.52	82.43	Agriculture	Dehbid
5.93	0.19	0.07	0.09	0.02	5.74	1.56	1.61	2.58	Drinking	
1.98	0.06	0.02	0.03	0.01	1.92	0.52	0.54	0.86	Industry	

Total consumption	Hardrock formation				Alluvial				Consumption	Plain
	Sum	Spring surface water	Qanat	Well	Sum	Spring surface water	Qanat	Well		
476.69	43.28	29.02	2.74	11.52	433.41	18.59	8.75	406.07	Agriculture	Namdan
19.57	4.27	0.91	3.00	0.36	15.30	0.15	0.27	14.88	Drinking	
6.52	1.42	0.30	1.00	1.12	5.10	0.05	0.09	4.96	Industry	
699.11	69.31	14.35	11.47	43.49	629.80	199.09	6.04	424.67	Agriculture	Beiza - Zarghan
14.09	2.19	0.45	0.36	1.37	11.90	0.19	0.19	11.52	Drinking	
9.39	1.46	0.30	0.24	0.92	7.93	0.12	0.13	7.68	Industry	
370.50	49.31	43.01	0.00	6.30	321.19	178.42	0.68	142.10	Agriculture	Dozkord - Kamphirouz
6.09	1.56	1.36	0.00	0.20	4.53	0.02	0.02	4.49	Drinking	
4.06	1.04	0.91	0.00	0.13	3.02	0.01	0.01	2.99	Industry	
168.67	6.02	4.31	1.14	0.57	162.65	146.48	6.11	10.06	Agriculture	Khosro shirin
3.27	0.14	0.14	0.00	0.00	3.14	2.63	0.19	0.31	Drinking	
1.09	0.05	0.05	0.00	0.00	1.05	0.88	0.06	0.11	Industry	
366.34	26.43	15.36	0.00	11.07	339.91	51.40	12.03	276.48	Agriculture	Asopas
10.06	0.83	0.48	0.00	0.35	9.23	0.22	0.38	8.64	Drinking	
3.35	0.28	0.16	0.00	0.12	3.08	0.07	0.13	2.88	Industry	
88.45	0.00	0.00	0.00	0.00	88.45	4.92	0.00	83.53	Agriculture	Bakan
1.67	0.00	0.00	0.00	0.00	1.67	0.00	0.00	1.67	Drinking	
0.56	0.00	0.00	0.00	0.00	0.56	0.00	0.00	0.56	Industry	
201.07	47.61	33.14	1.97	12.50	153.46	32.71	37.63	83.12	Agriculture	Shiraz
124.91	98.23	22.24	0.00	75.99	26.68	6.94	0.00	19.74	Drinking	
10.93	0.89	0.00	0.00	0.89	10.04	0.00	0.00	10.04	Industry	
117.75	27.65	2.30	0.00	25.35	90.09	3.89	0.00	86.20	Agriculture	Gharebagh
1.90	0.40	0.00	0.00	0.40	1.50	0.00	0.00	1.50	Drinking	
3.17	0.66	0.00	0.00	0.66	2.51	0.00	0.00	2.51	Industry	
104.12	10.32	0.00	0.00	10.32	93.80	0.00	0.00	93.80	Agriculture	avar Maharlu
2.17	0.22	0.00	0.00	0.22	1.95	0.00	0.00	1.95	Drinking	
2.17	0.22	0.00	0.00	0.22	1.95	0.00	0.00	1.95	Industry	
89.24	7.35	3.83	0.28	3.24	81.89	0.82	0.82	80.26	Agriculture	Savestan
1.55	0.23	0.16	0.00	0.07	1.32	0.03	0.03	1.26	Drinking	
1.32	0.07	0.00	0.00	0.07	1.26	0.00	0.00	1.26	Industry	
23.72	6.27	0.00	0.00	6.27	17.45	0.00	0.00	17.45	Agriculture	Goshnegan
0.95	0.56	0.00	0.00	0.56	0.39	0.00	0.00	0.39	Drinking	
0.27	0.14	0.00	0.00	0.14	0.13	0.00	0.00	0.13	Industry	
5617.47	587.95	239.95	42.87	305.13	5029.52	1276.34	272.34	3480.84	Agriculture	Total basin
297.73	128.84	34.35	4.67	89.81	168.89	25.06	11.60	132.24	Drinking	
70.06	11092	3.50	1.89	۶,۰۳	58.14	3.04	1.92	53.17	Industry	

Table 56: Extracted water of alluvial aquifers

Column	Study area	Code	Aquifer					
			Well		Qanat		Spring	
			Number	Discharge	Number	Discharge	Number	Discharge
1	Tavabee Arsanjan	4301	1912	58.27	2	0.00	6	0.00
2	Arsanjan	4302	616	121.43	2	0.87	13	3.77
3	Seydan – Farough	4303	1781	169.23	23	17.51	10	11.76
4	South tashk lake	4304	5	0.02	0	0.00	3	0.00
5	Abadetashk - Jahanabad	4305	618	128.91	3	5.65	17	3.60
6	Khanekkat	4306	541	27.23	11	1.48	0	1.44
7	Kheir	4307	277	28.81	3	0.00	6	0.00
8	Estahban	4308	56	21.81	2	0.27	1	15.76
9	Neyriz	4309	417	43.77	9	5.90	5	3.27
10	Tanghena-Pichakan	4310	205	32.02	1	0.03	0	0.03
11	Marvdasht - Khrameh	4311	9323	837.69	3	0.12	18	28.42
12	Darian	4312	780	94.57	3	0.63	0	0.63
13	Saadatabad	4313	751	164.94	7	9.75	0	4.70
14	Sarpaniran	4314	254	16.93	28	8.98	0	3.04
15	Ghaderabd - Madarsoliman	4315	609	49.85	202	52.58	18	40.94
16	Dehbid	4316	415	85.86	139	53.67	13	51.91
17	Namdan	4317	2597	495.91	28	9.11	4	44.99
18	Beiza – Zarghan	4318	4893	283.86	74	6.36	48	6.36
19	Khosroshirin	4319	1534	69.58	13	0.71	3	0.71
20	Khosroshirin	4320	50	10.48	24	6.36	15	87.72
21	Asopas	4321	۱۰۰۴	288.00	35	12.53	19	7.22
22	Bakan	4322	364	55.76	0	0.00	2	4.47
23	Shiraz	4323	2247	82.52	25	31.27	12	31.27
24	Gharebagh	4324	2446	100.21	4	0.00	6	0.00
25	Kavar Maharlu	4325	828	97.90	0	0.00	0	0.00
26	Sarvestan	4326	1125	62.77	11	0.85	0	0.85
27	Goshnegan	4327	177	12.97	0	0.00	2	0.00

Table 57: General water balance in the basin

Column	Study areas	Code	Input					Output								Storage changes
			Rainfall	Surface flow	Groundwater flow	Transmitted water	Sum	Evapotranspiration				Surface flow	Groundwater flow	Transmitted water	Sum	
								Net consumption	Aquifer	Free water	Rainfall					
1	Tavabee Arsanjan	4301	62.6	44.47	35.38	-	159.53	64.71	-	-	49.36	44.00	21.4	-	179.47	-19.94
2	Arsanjan	4302	210.35	-	-	-	298.43	181.34	-	-	107.07	22.70	42.4	-	353.51	-55.08
3	Seydan-Farough	4303	79.78	-	52.5	-	193.06	75.61	-	0.74	158.75	11.35	15.41	-	261.86	-68.80
4	South Tashk lake	4304	34.01	-	-	-	48.96	36.99	-	0.30	-	5.33	6.3	-	48.91	-
5	Abadetashk-Jahanabad	4305	187.67	23.82	10.3	-	421.46	240.24	108.50	-	136.55	-	-	-	485.29	-63.83
9	Khanekat	4306	60.19	-	-	-	112.41	80.26	-	-	28.54	7.11	6.72	-	122.63	-10.22
7	Khir	4307	22.41	15.20	11.19	-	93.62	41.36	-	-	24.82	34.72	0.26	-	101.16	-7.54
8	Estahban	4308	80.50	-	-	-	125.52	83.90	-	-	38.39	18.34	9.72	-	150.35	-24.83
6	Neyriz	4309	88.23	-	1.08	-	201.51	174.4	-	-	47.01	6.60	-	-	228.01	-26.50

	-12.60	-37.82	-51.73	-15.02	-28.75	7.06	-36.75	-102.41
	1031.14	2297.86	173.38	522.12	175.46	1044.76	562.07	939.65
	-	154.54	-	-	-	-	-	5.36
	1.08	42.22	0.18	30.38	-	12.14	7	25.92
	-	442.62	10.78	126.70	32.30	107.69	37.60	1.41
	27.89	829.50	94.10	207.84	46.47	278.15	185.87	377.03
	-	33.40	-	-	-	-	-	8.67
	722.44	-	-	-	-	-	-	60.7
	279.7	795.58	68.32	157.20	96.69	646.78	331.6	460.56
	1018.54	2260.04	121.65	507.1	146.71	1051.82	525.32	837.24
	-	-	-	-	-	-	-	-
	9.01	0.33	-	62.14	-	14.02	1.21	-
	690.012	707.69	-	156.07	-	49.50	1.85	-
	180.64	889.34	66.71	73.43	56.75	566.4	353.01	537.60
	138.77	62.68	54.94	215.46	89.96	421.90	169.25	299.63
	4310	4311	4312	4313	4314	4315	4316	4317
Tanghana -Pichakan	Marvdasht- Kherameh	Darian	Saadatabad	Sarpaniran	Ghaderabad- Madersoliman	Dehbid	Namdan	
10	11	12	13	14	15	16	17	

Storage changes	-12.38	-28.06	0.00	-38.28	-31.71	-23.05	-55.63	-50.61	
	Sum	1006.69	1402.91	278.69	776.85	192.50	623.12	217.79	179.56
	Transmitted water	-	31	-	-	-	-	-	
	Groundwater flow	6.8	22.50	-	-	38.3	0.56	-	0.85
	Surface flow	49.13	326.27	110.00	110.00	-	26.10	25.90	10.05
Output	Net consumptio	529.63	298.42	62.20	277.43	54.37	201.60	88.14	84.60
	Aquifer	18.50	-	0.16	1.10	-	2.20	1.81	-
	Free water	-	81.01	-	-	-	-	-	-
	Rainfall	402.633	643.71	106.335	405.00	99.83	392.66	101.93	84.06
	Sum	994.313	1374.85	278.69	738.579	160.79	600.07	162.158	128.95
Input	Transmitted water	193.94	-	-	-	-	31	-	-
	Groundwater flow	32.70	13.75	33.50	-	-	-	0.85	-
	Surface flow	-	262.22	-	-	-	-	13.05	-
	Plain	414.641	182.76	129.294	410.22	66.6	216.99	66.2108	61.9144
	Height	353.05	916.124	115.896	328.359	94.13	352.08	82.046	67.03
Code	4318	4319	4320	4321	4322	4323	4324	4325	
Study areas	Beiza-Zarghan	Dozkord-Kamphiroz	Khosroshirin	Asopas	Bakan	Shiraz	Gharebagh	KavarMa harlu	
Column	18	19	20	21	22	23	24	25	

-22.08	-6.11	-838.25
555.32	293.20	14219.891
-	-	190.90
47.1	-	337.32
36.80	-	1583.80
71.96	19.25	4324.97
1.90	-	69.03
-	171.83	1144.481
397.56	102.116	6569.4
533.243	287.09	13381.65
-	-	224.94
-	48.18	326.245
-	186.1	2150.09
372.806	15.295	5298.34
160.43	37.509	5382.03
4326	4327	Total basin
Sarvestan	Goshnegan	
29	27	

Table 58: Percentage rainfall, runoff and evapotranspiration

Study area	Area	Evapotranspiration	Runoff	Rainfall
Marvdasht - Kherameh	Height	45/12	14/62	40/26
	Plain	55/84	5/78	38/38

Table 59: Hydro climatology balance

Area	Area	Rainfall volume	Evapotranspiration	Useful rainfall(McM)	
	Cubic Killometer			Runoff	Penetration
Plain	2452	889/34	496/58	51/40	341/33
Height	1488/5	662/68	299/00	96/88	266/80
Totall	3940/5	1552/02	795/58	148/29	608/12

Table 60: General balance water

Input(MCM/Y)				Output(MCM/Y)								Reservior c
Surface water inflow	Ground water flow	Transitional water	Sum	Evaportranspiration				Surface water outflow	Groundwater outflow	Transition al water	Sum	Surface water
				Rainfall	Aquifer	Lakes	Net consumption					
707/69	0/33	0	2260	795/5797	33/4	0	829/5	442/62	42/22	154/54	2298	-

Table 61: Crop pattern in study area

Product	Area(hectares)	Percent
Cereals	89064	85.22
Feed	5068	4.85
beans	1996	1.9
Vegetables	4177	3.99
Cucurbits	410	0.39
Another products	2547	2.43
Total irrigated garden	5733	5.2
Total area under cultivate	110241	100
Planting density	100	

Table 62: irrigation calendar in study area

April	Feb	Jun	Dec	No v	Oct	Sep	Aug	Jul	Jun	May	March	Product
↓	-	-	-	-	-	-	-	-	-	↓	↓	Wheat
↓	-	-	-	-	-	-	-	-	-	↓	↓	Barley
-	-	-	-	-	↓	↓	↓	↓	-	-	-	Rice
↓	-	-	-	-	-	-	-	-	↓	↓	↓	Cucumb er
↓	-	-	-	-	-	-	-	-	↓	↓	↓	Estival
↓	-	-	-	-	-	-	-	-	↓	↓	↓	Tomato
↓	-	-	-	-	↓	↓	↓	↓	↓	↓	↓	Citrous fruits
-	-	-	-	-	↓	↓	↓	↓	↓	↓	↓	Flame
-	-	-	-	↓	↓	↓	↓	↓	↓	↓	↓	Apple
-	-	-	-	↓	↓	↓	↓	↓	↓	↓	↓	Grape

Irrigation in each month shows by



Table 63: Water requirement of crops

Product		Water requiremen t(m3/hect)	Irrigation efficiency(%)	Water requireme nt(m3/hect)	Return Water	ET (m3/hect)	Water Requiremen t(m3/hect)
Cereals	Wheat	6550	44	14886/36	3721/59	4465/91	11330/77
	Barley	5280	44	12000/00	3000/00	3600/00	9166/00
	Rice	8720	44	19818/18	4954/55	5945/45	14863/64
	Maize	7070	44	16068/18	4017/05	4820/45	12051/14
Frijol	Pea	5180	44	11772/73	2943/18	3531/82	9109/55
	Beans	6440	44	14636/36	3659/09	4390/91	10977/27
	Lentil	6500	44	14772/73	3693/18	4431/82	11107/55
Industrial crops	Sugar beet	10140	44	23045/45	5761/36	6913/64	17284/09
	Rapeseed	3500	44	7954/55	1988/64	2386/36	6050/91
	Another oil seed	5343	44	12143/18	3035/80	3642/95	9157/39
Cucurbits	Potato	5820	44	13227/27	3306/82	3968/18	9983/45
	Onion	6052	44	13754/55	3438/64	4126/36	10327/91
	Tomato	7290	44	16568/18	4142/05	4970/45	12426/14
	Vegetables	6200	44	14090/91	3522/73	4227/27	10593/18
Forage plants	Alfalfa	9990	44	22704/55	5676/14	6811/36	17205/41
	Corn silage	4890	44	11113/64	2778/41	3334/09	8485/23

Table 64: Water requirement of garden products

Product	Water Requirement (m3/hect)	Irrigation efficiency (%)	Water requirement(m3/hect)	Return Water	ET (m3/hect)	Water Requirement (m3/hect)
Apple	11470	60	19116/667	4779/167	2485/167	14347/5
Quince	10430	60	17383/333	4345/833	2259/833	13062/5
Plum	8210	60	13683/333	3420/833	1778/833	10283/5
Sparkling Peach	7440	60	12400/000	3100/000	1612/000	9317
Apricot	8210	60	13683/333	3420/833	1778/833	10283/5
Apricot halves	9520	60	15866/667	3966/667	2062/667	11921
Nectarines	5690	60	9483/333	2370/833	1232/833	7140/5
Grape	7440	60	12400/000	3100/000	1612/000	9317
Pomegranate	9620	60	16033/333	4008/333	2084/333	12092
Persimmon	7210	60	12016/667	3004/167	1562/167	9047/5
Pistachios	8970	60	14950/000	3737/500	1943/500	11282/5
Almonds	9140	60	15233/33	3808/333	1980/333	11446
Walnut	8140	60	13566/667	3391/667	1763/667	10196
Olive	4370	60	7283/333	1820/833	946/833	5562/5
Rose	4520	60	7533/333	1883/335	979/333	5691

Table 65: Water productivity indicators

column	Product	CPD	BPD	NBPD
1	Wheat	0/32	336/50	158/99
2	Barley	0/38	249/54	186/19
3	Rice	0/38	1039/23	775/92
4	Maize	0/63	549/26	268/99
5	Pea	0/13	234/87	187/97
6	Beans	0/11	208/21	135/59
7	Cucumber	0/77	169/41	126/82
8	Oil seed	0/90	1717/91	1570/55
9	Potato	3/05	916/29	716/69
10	Onion	9/32	2050/55	698/81
11	Tomato	4/35	1088/01	466/27
12	Another vegetable	3/99	798/73	755/73
13	Alfaalfa	0/67	466/83	207/91
14	Corn silage	10/17	4067/10	3587/56
15	Suger beet	7/23	1519/35	1038/12

Appendix of figures tables (b)

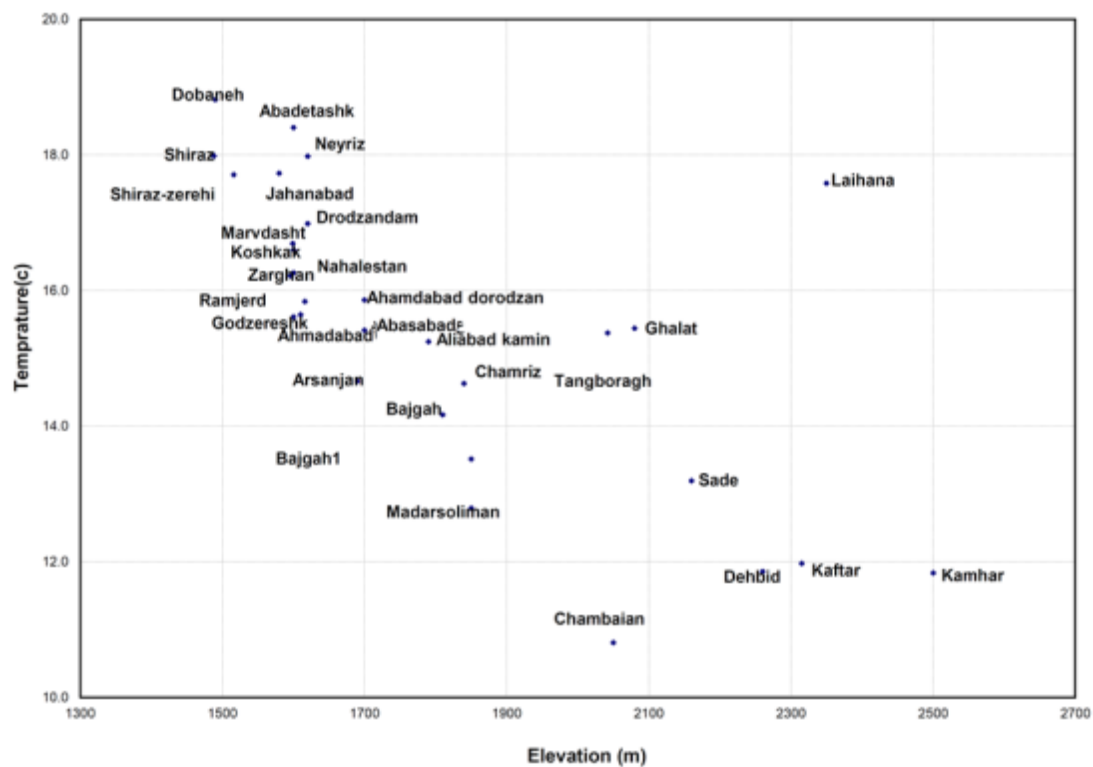


Figure1: Variation of temperature along with altitude in the basin

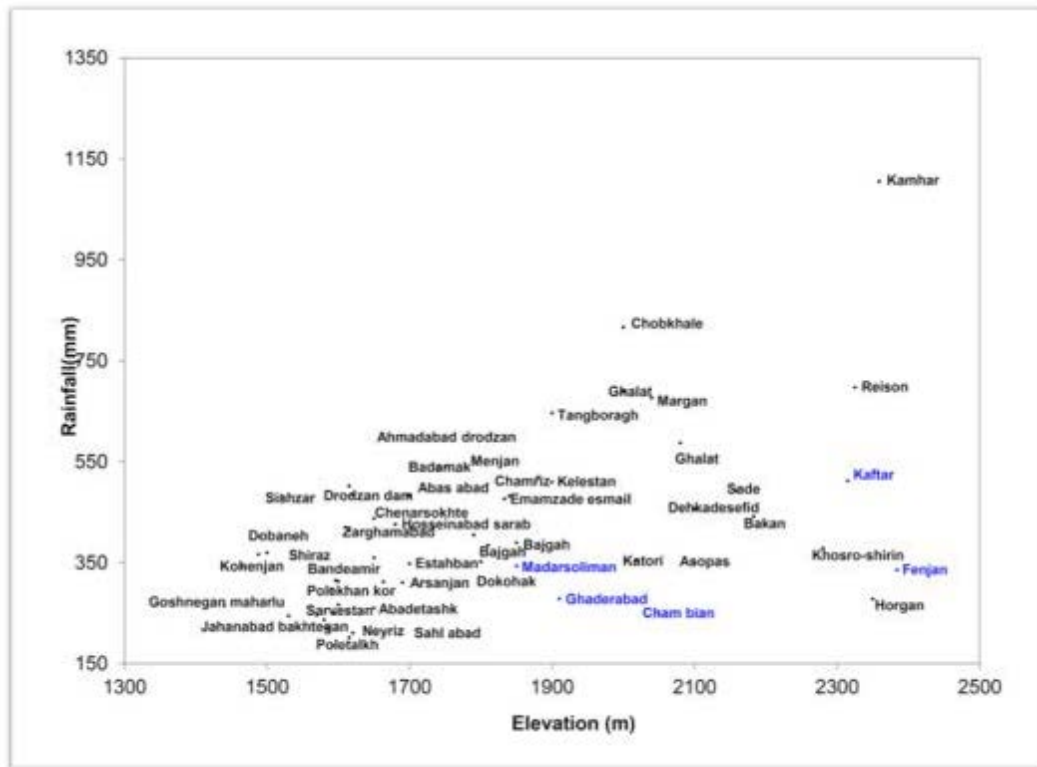


Figure 2: Changes in rainfall with altitude

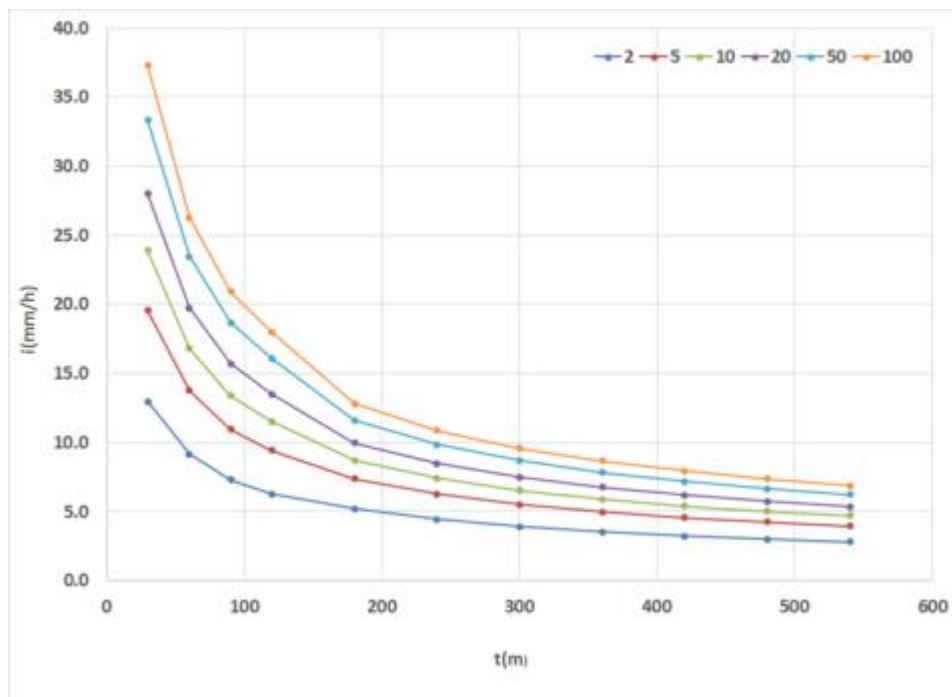


Figure 3: IDF curve of Arsanjan station

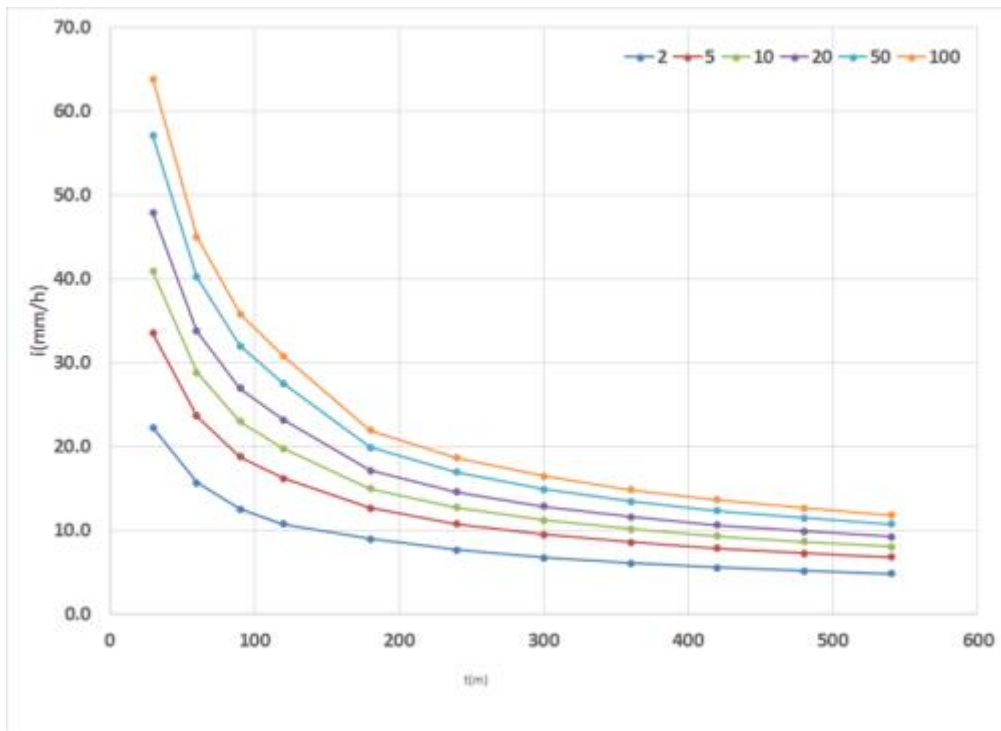


Figure 4: IDF curve of Chobkhaleh station

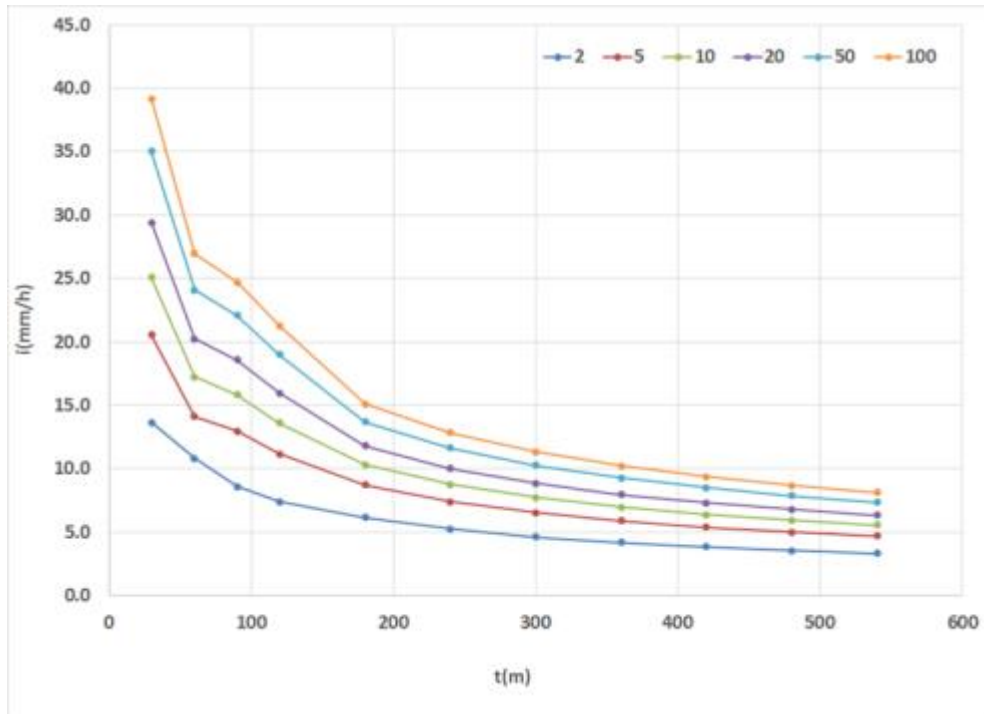


Figure 5: IDF curve of Jamalbeig station

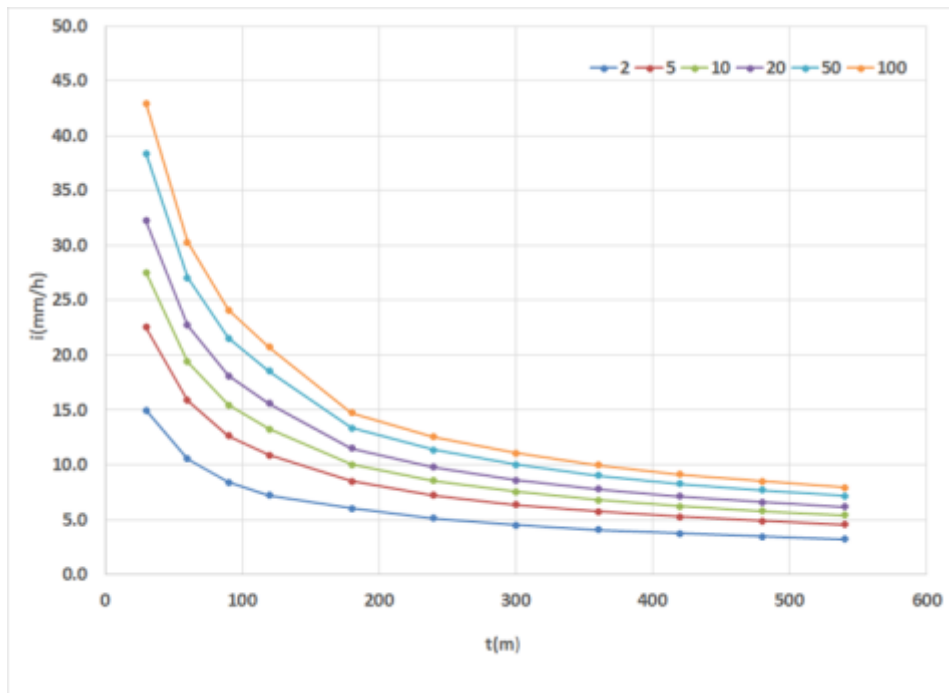


Figure 6: IDF curve of Drodzandam station

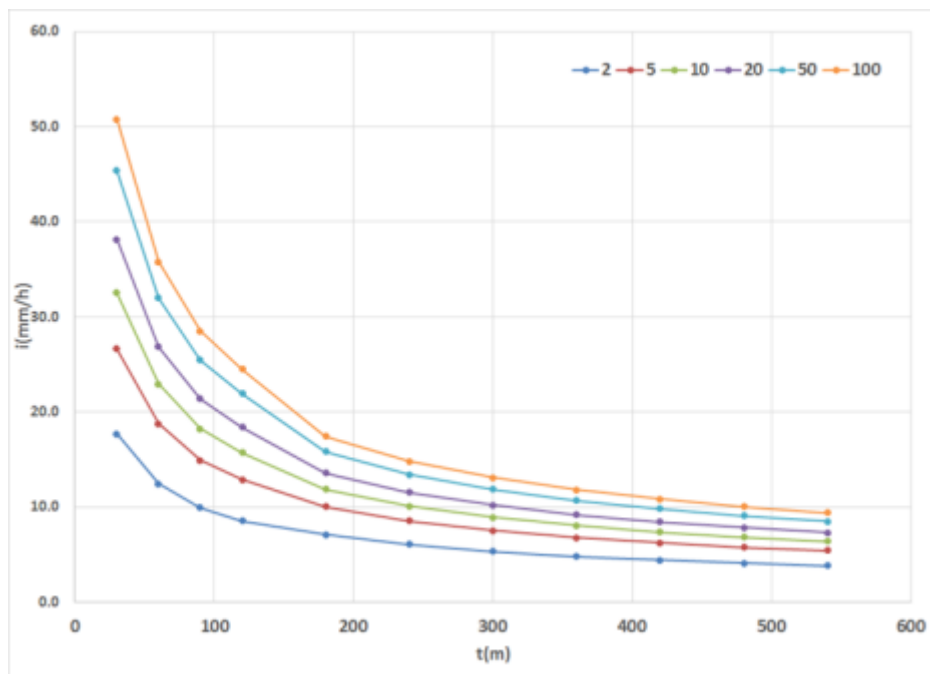


Figure 7: IDF curve of Ghalat station

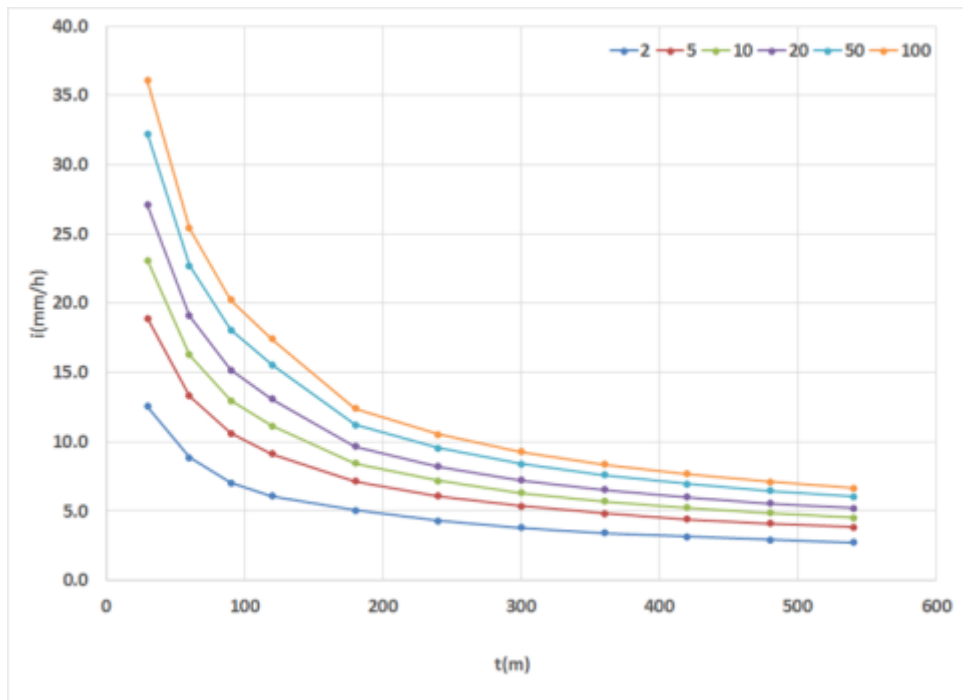


Figure 8: IDF curve of Shiraz station

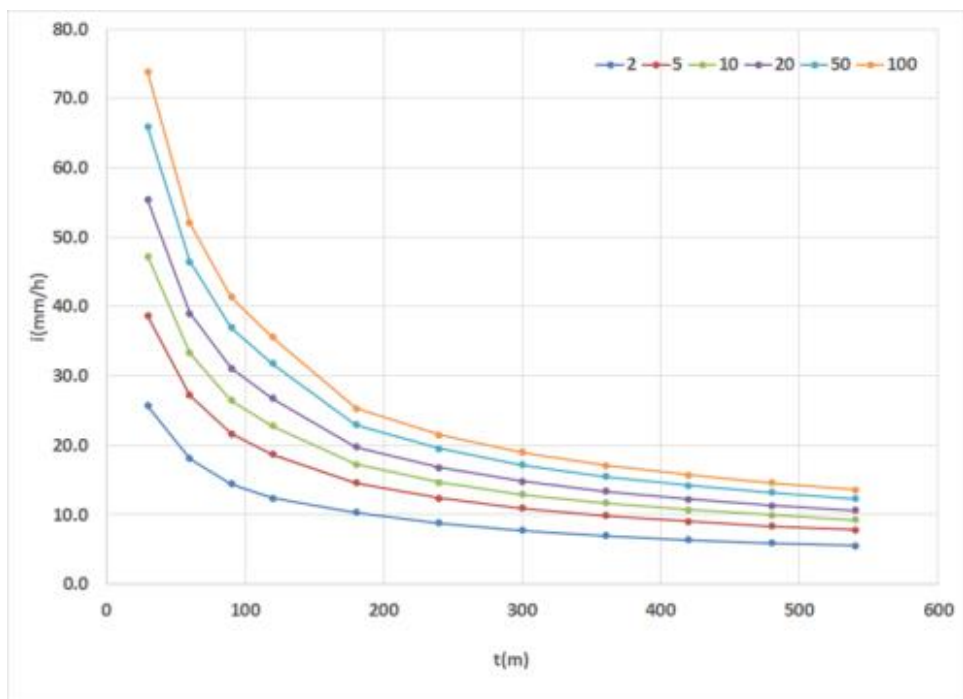


Figure 9: IDF curve of Mehrabad ramjerd station

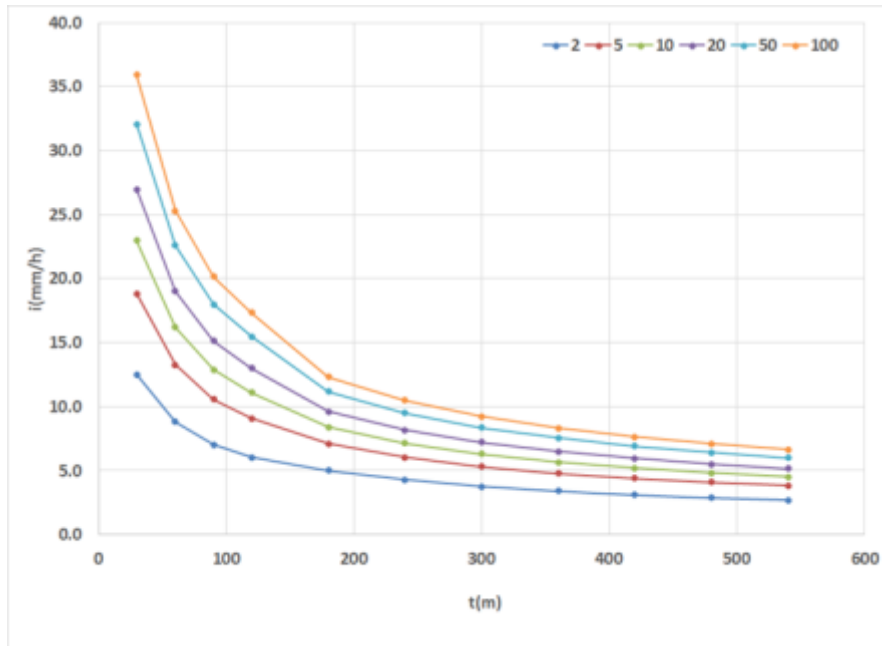


Figure 10: IDF curve of Dashtbal station

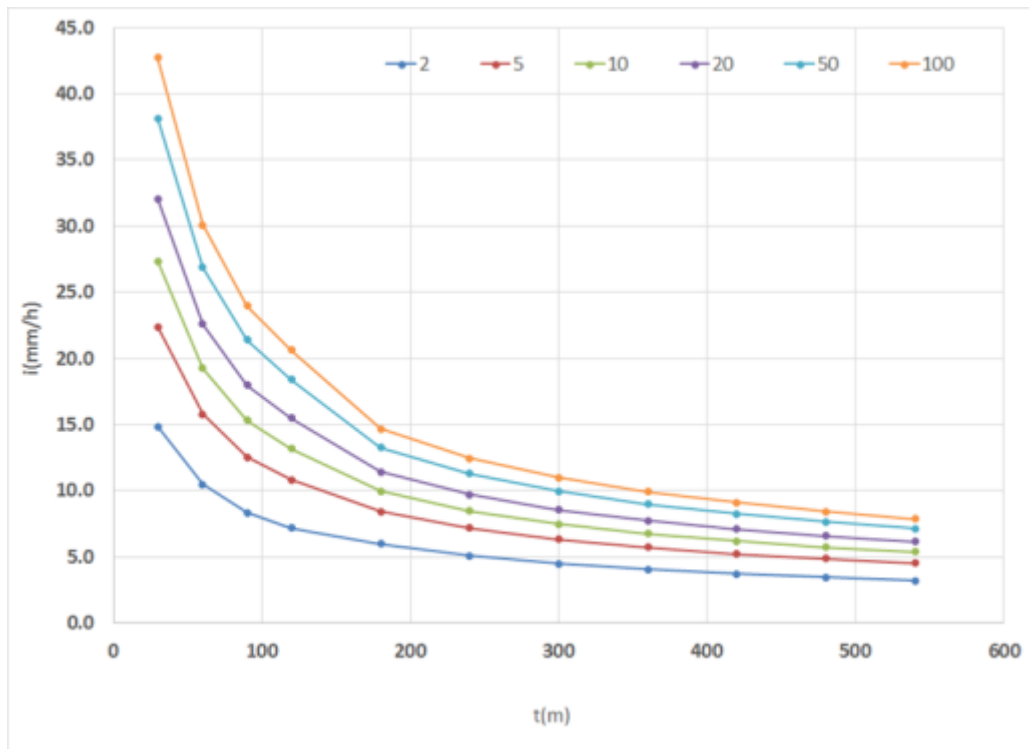


Figure 11: IDF curve of Chamriz station

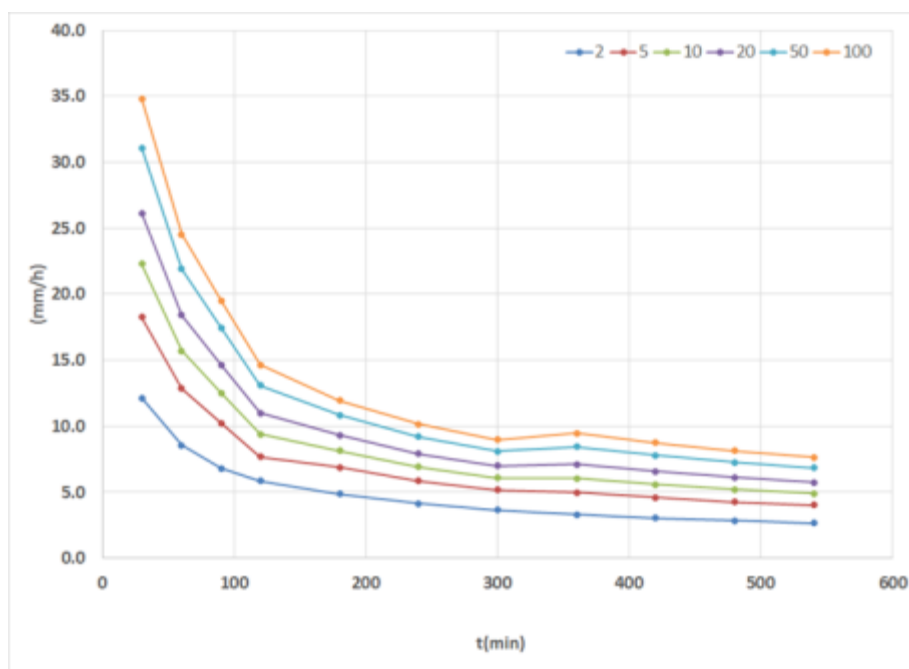


Figure 12: IDF curve of Arsanjan station

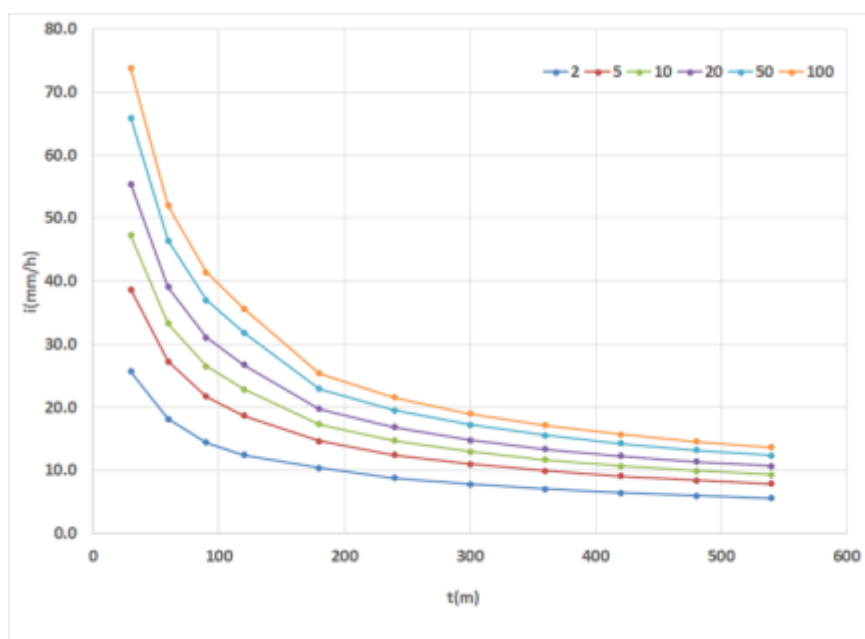


Figure 13: IDF curve of Kamhar station

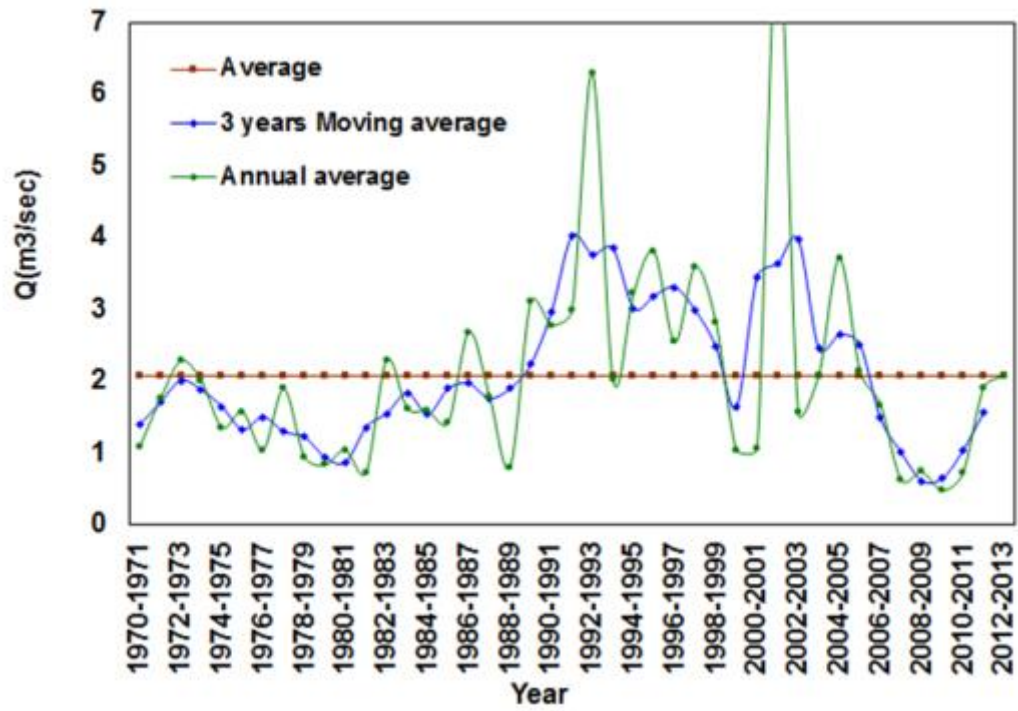


Figure 14: Moving average in Babahaji station

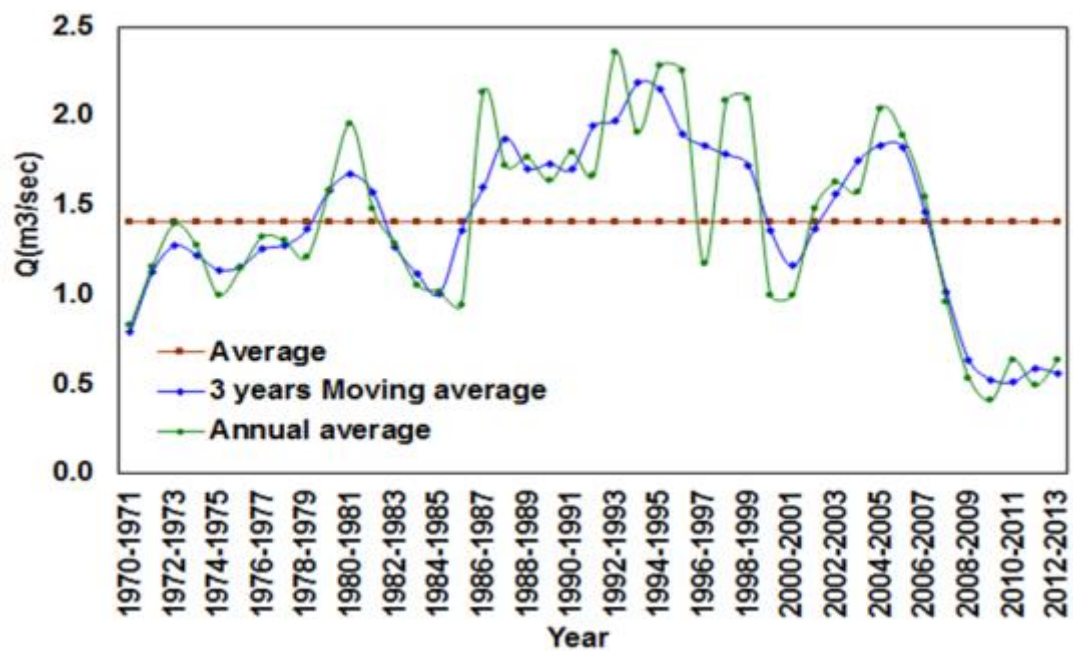


Figure 15: Moving average in Chenarsokhte (Nahrazam) station

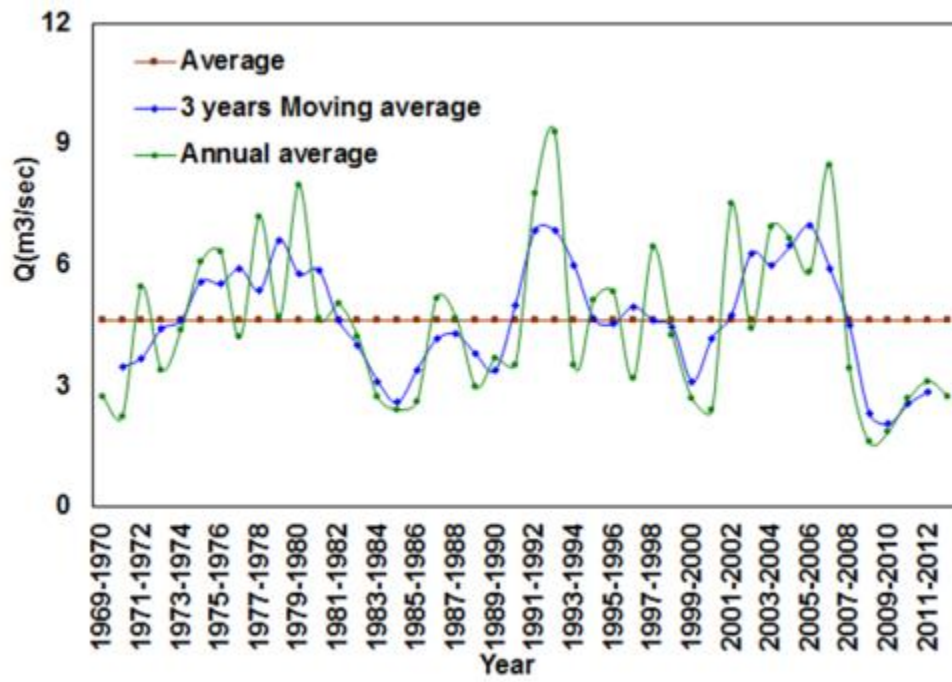


Figure 16: Moving average in Sefid station

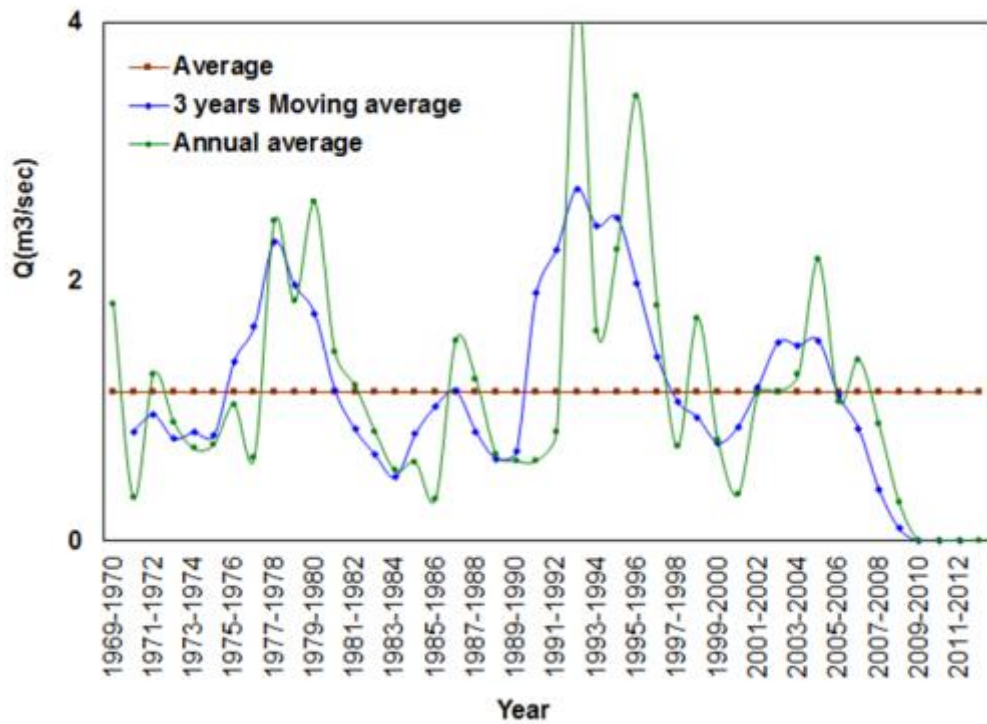


Figure 17: Moving average in Tangebolaghi station

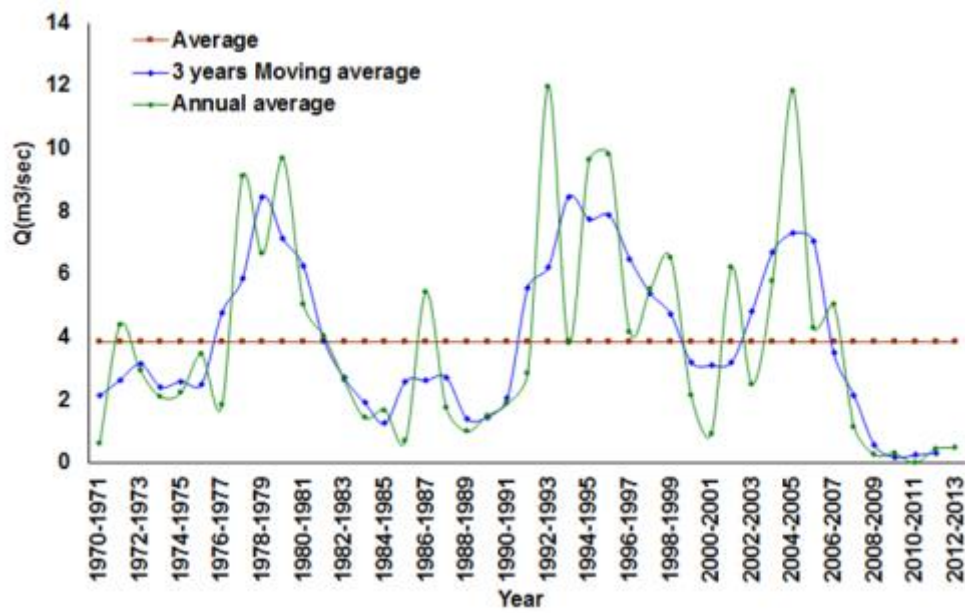


Figure 18: Moving average in Dashtbal station

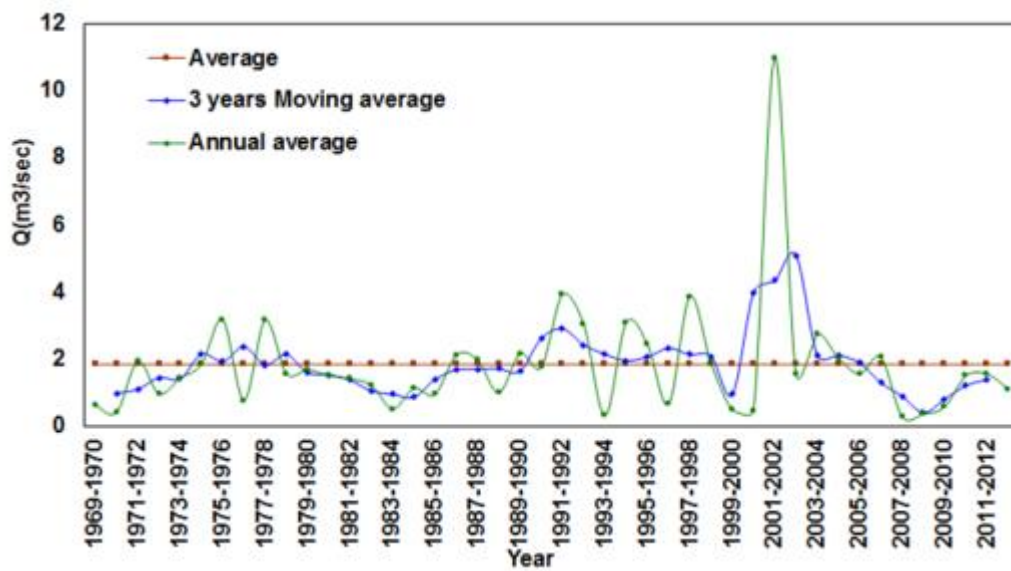


Figure 19: Moving average in Shorkharestan station

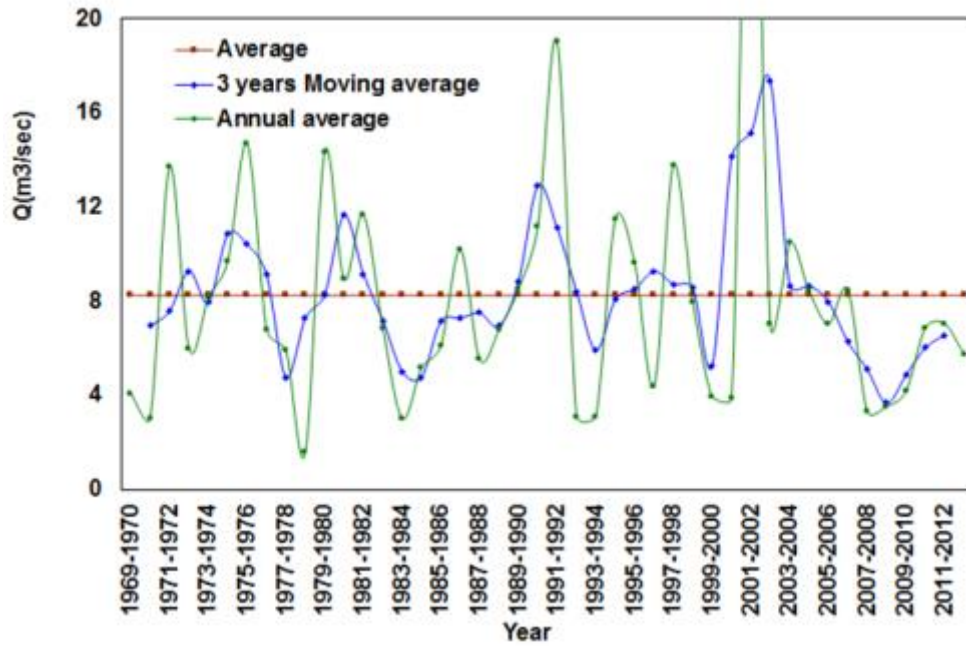


Figure 20: Moving average in Jamalbeig station

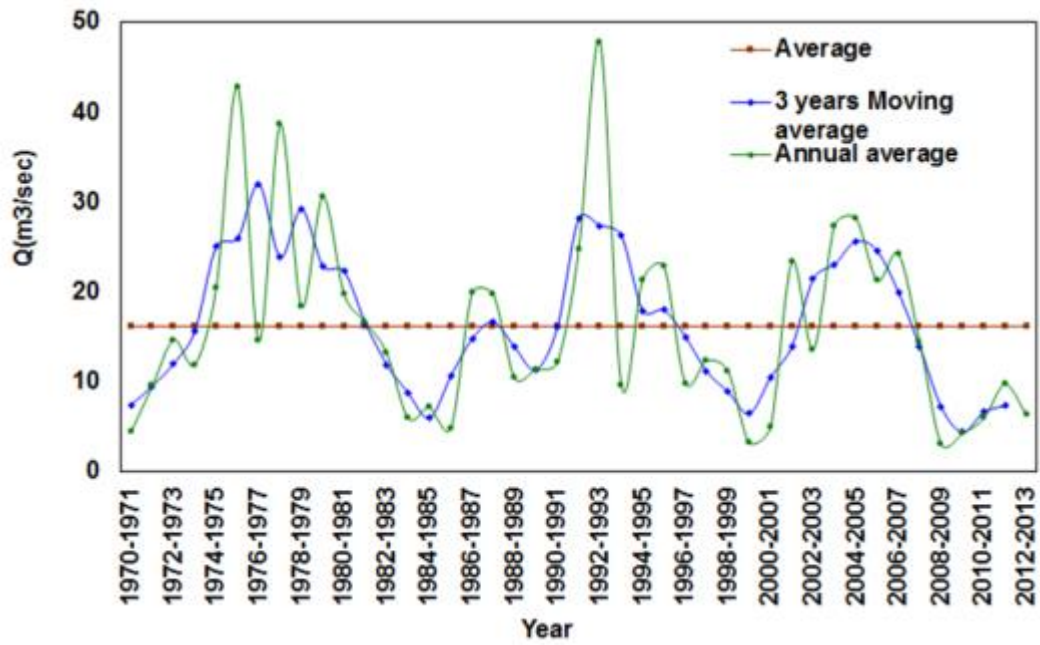


Figure 21: Moving average in Drodzan dam station

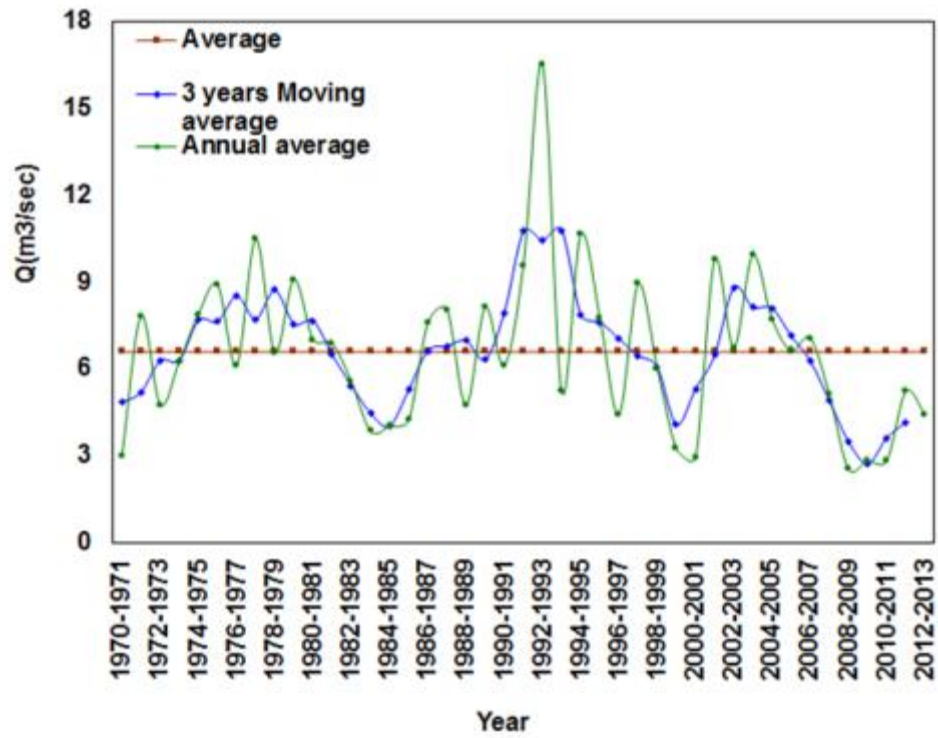


Figure 22: Moving average in Gavgodar dam station

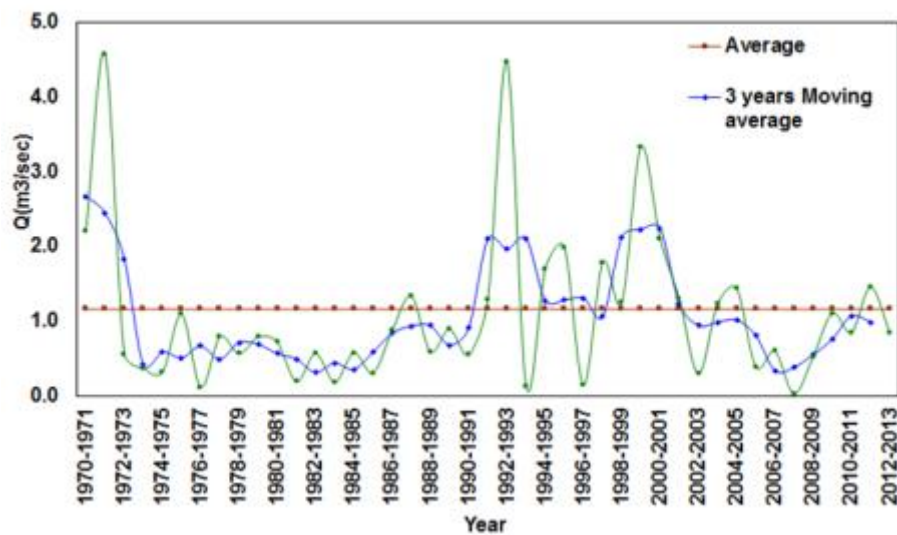


Figure 23: Moving average in Nahrazam dam station

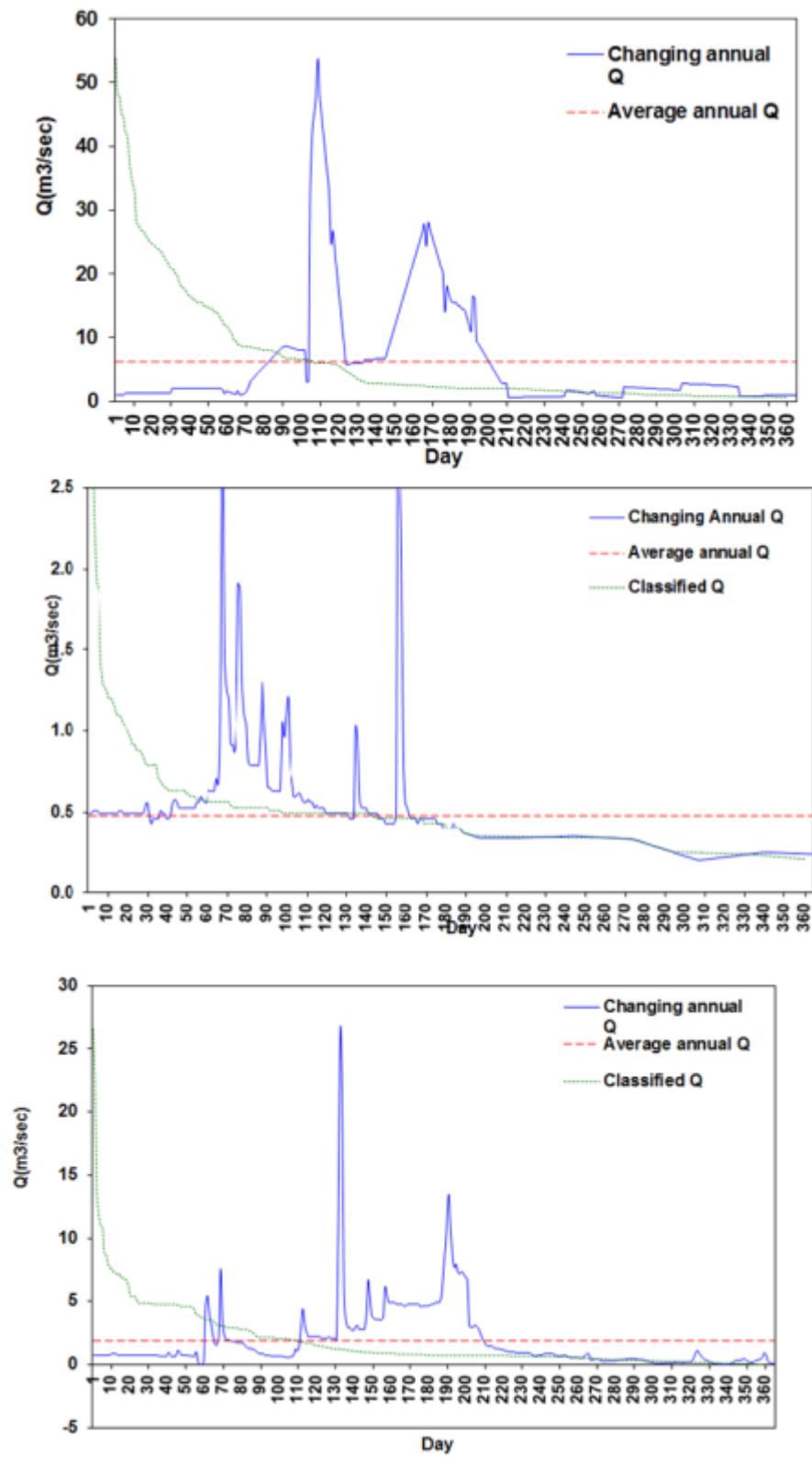


Figure 24: Changes in annual discharge and discharge classed curve at Babahaji station respectively for wet, dry and average years

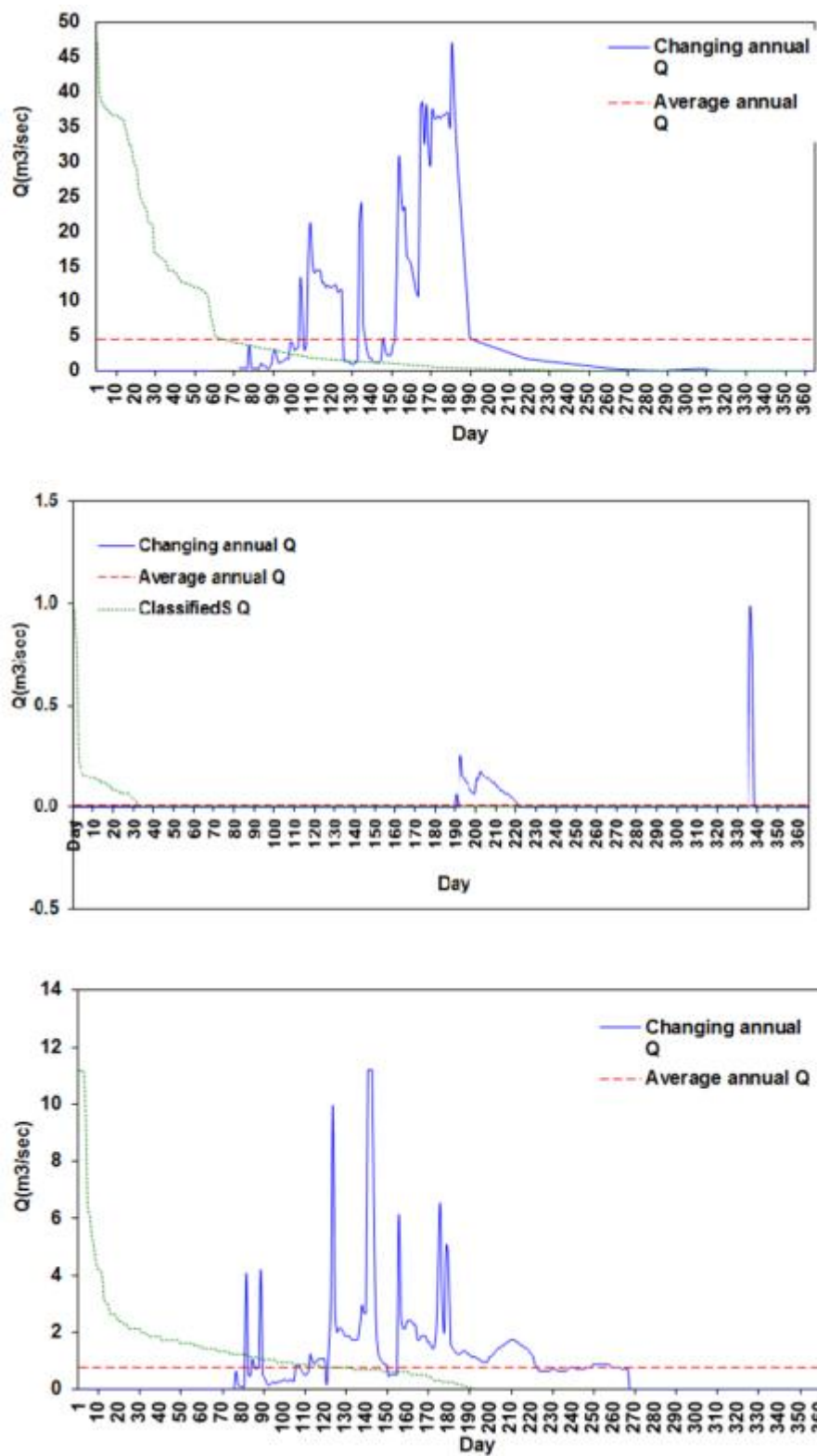


Figure 25: Changes in annual discharge and discharge classed curve at Chenarsokhte station respectively for wet, dry and average years

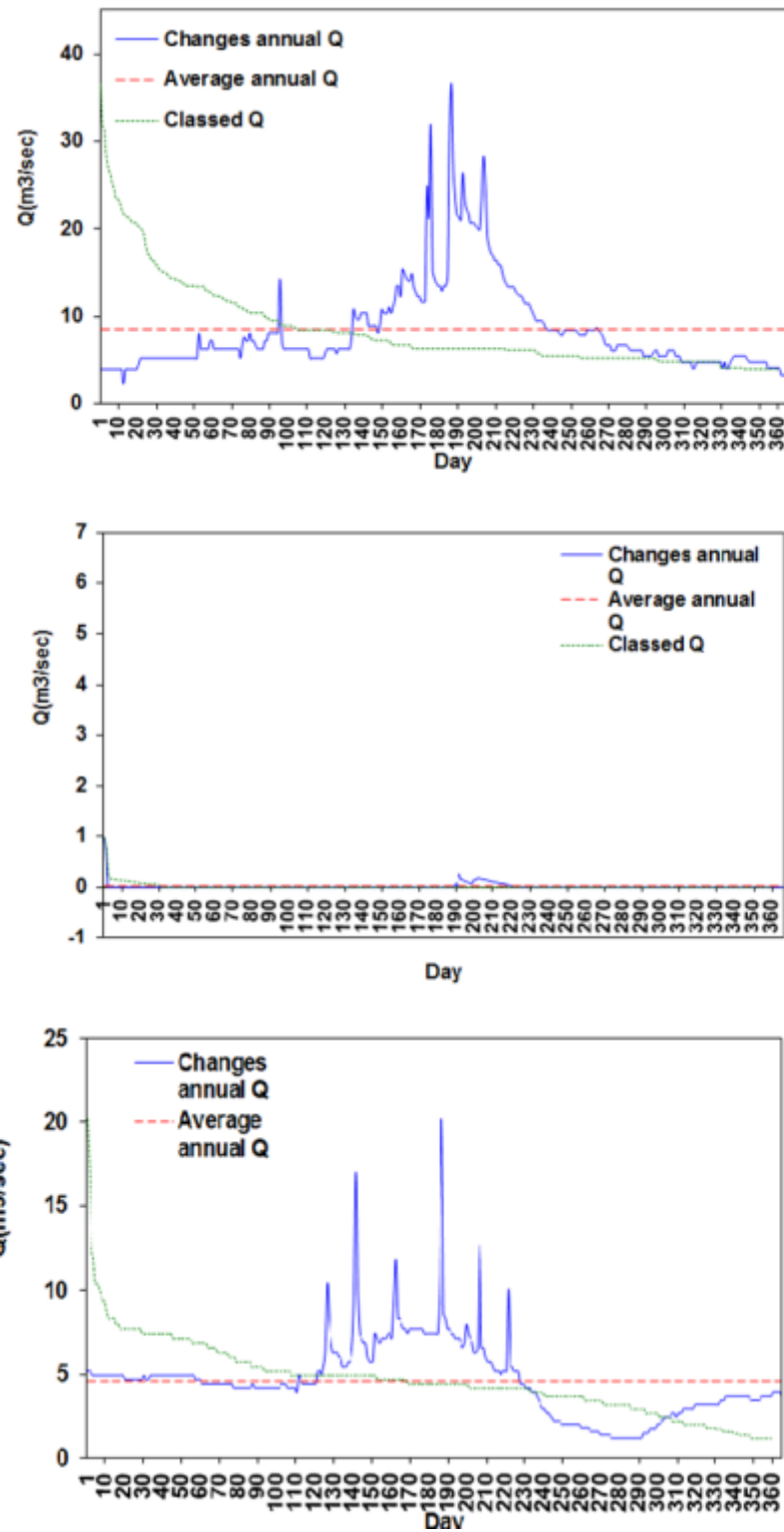


Figure 26: Changes in annual discharge and discharge classed curve at Dehkadesefid station respectively for wet, dry and average years

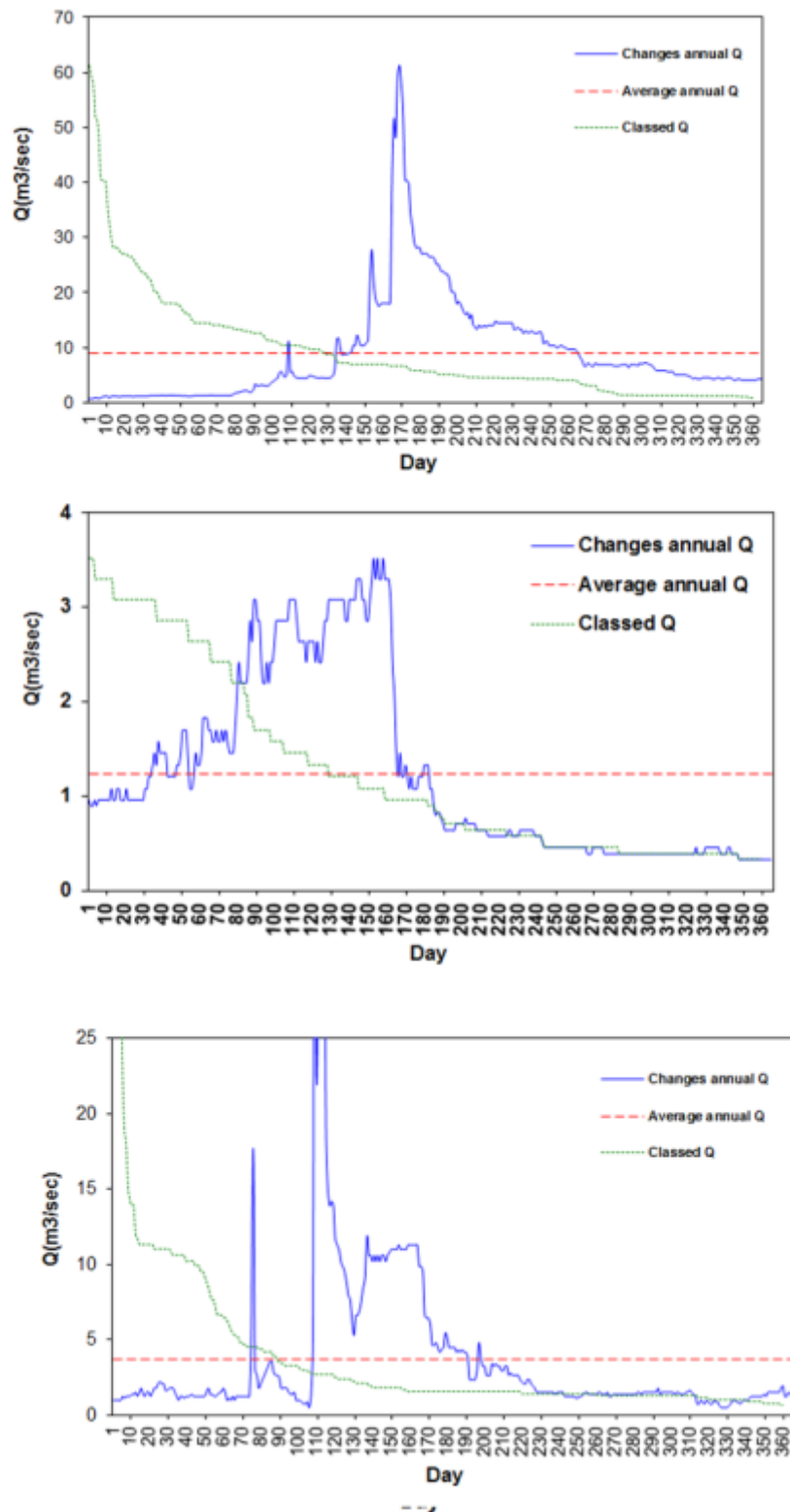


Figure 27: Changes in annual discharge and discharge classed curve at Tangebologhi station respectively for wet, dry and average years

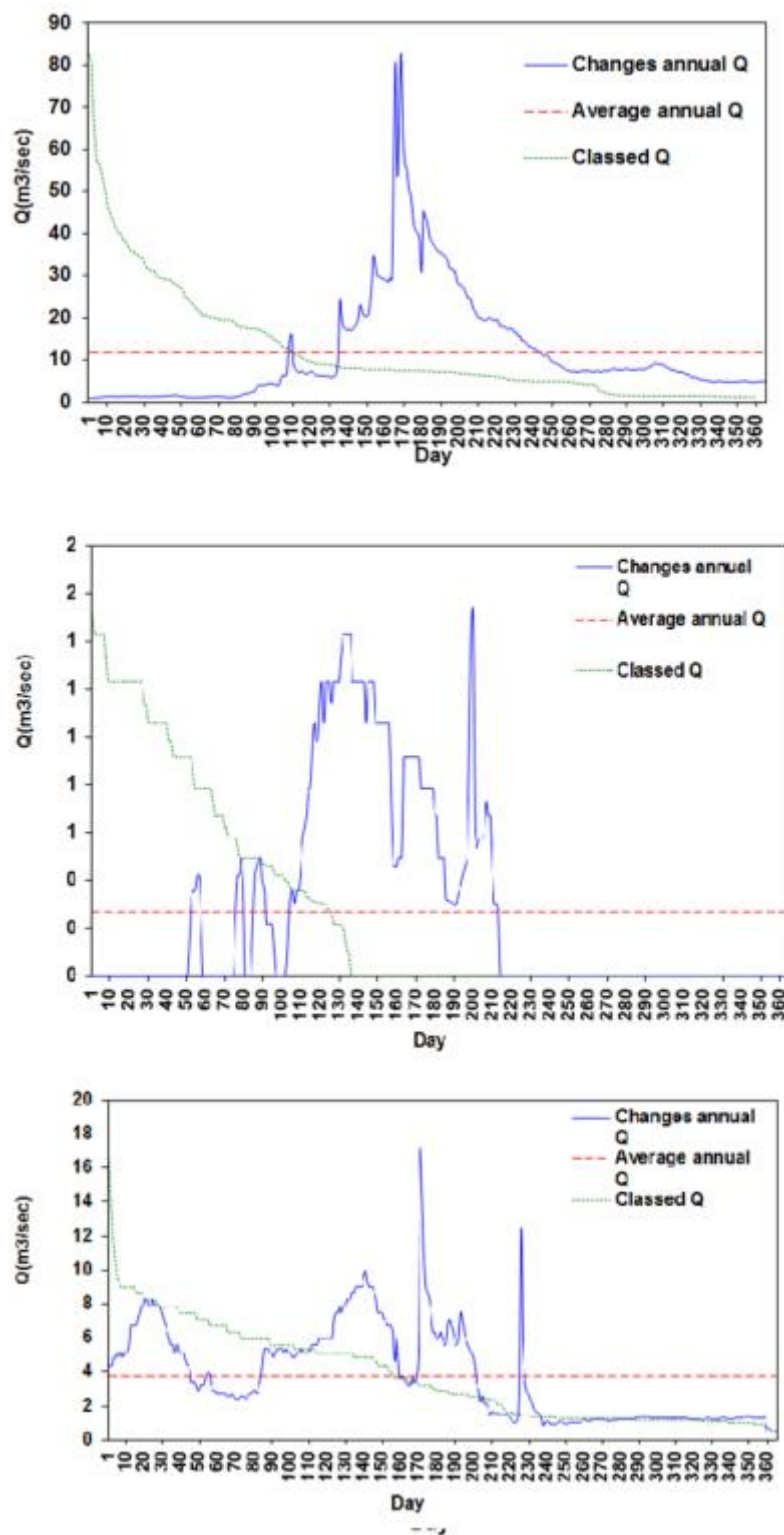


Figure 28: Changes in annual discharge and discharge classed curve at Dashtbal station respectively for wet, dry and average years

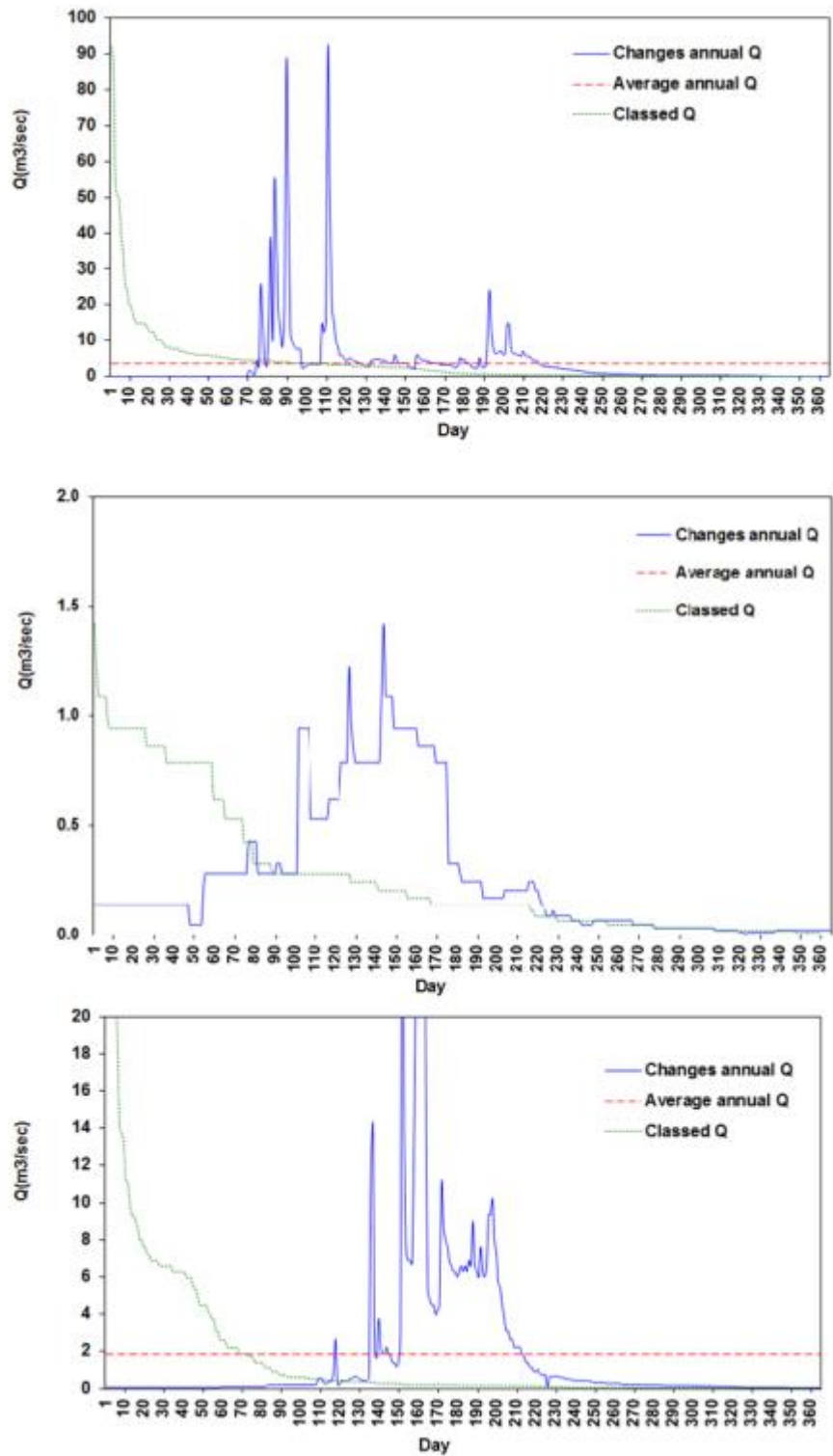


Figure 29: Changes in annual discharge and discharge classed curve at Shorkharestan station respectively for wet, dry and average years

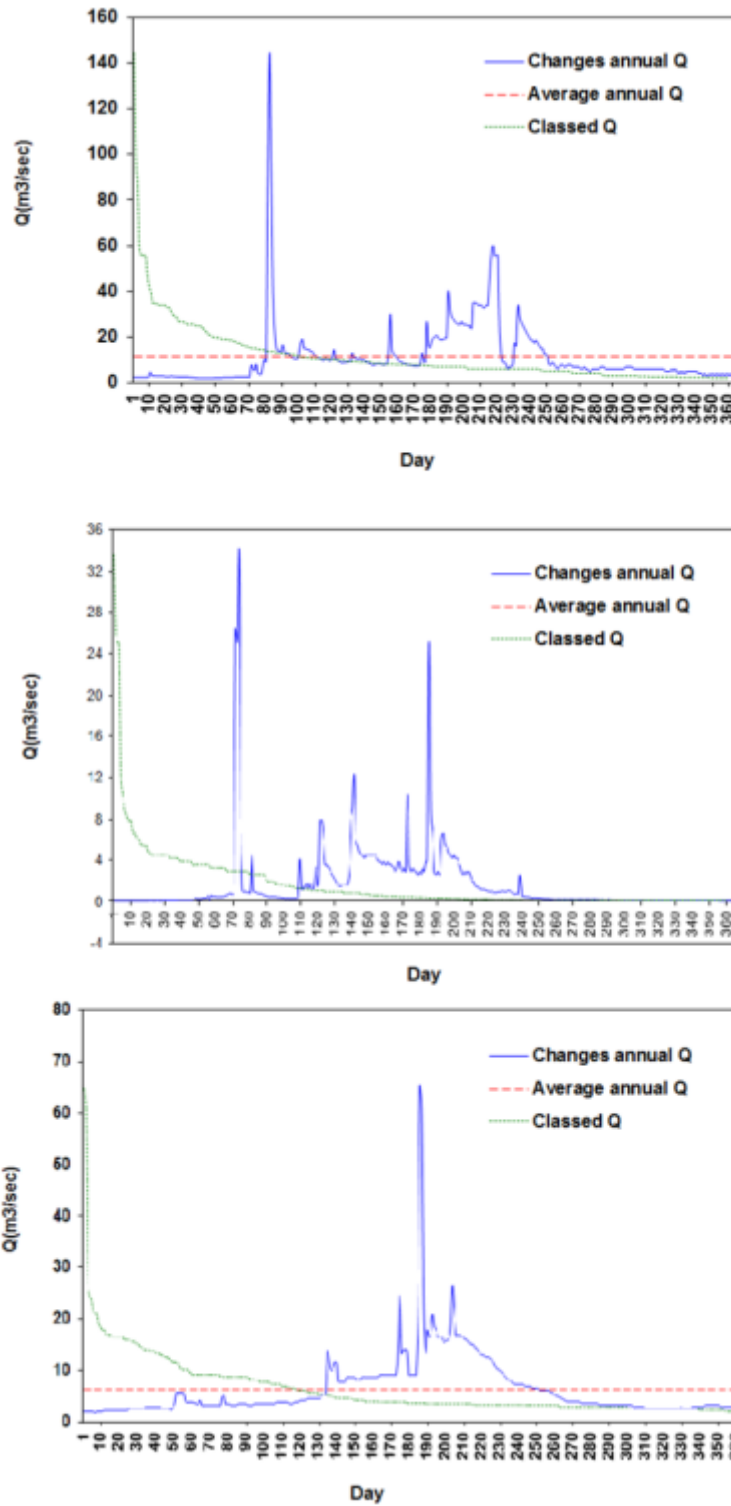


Figure 30: Changes in annual discharge and discharge classed curve at Jamalbeig station respectively for wet, dry and average years

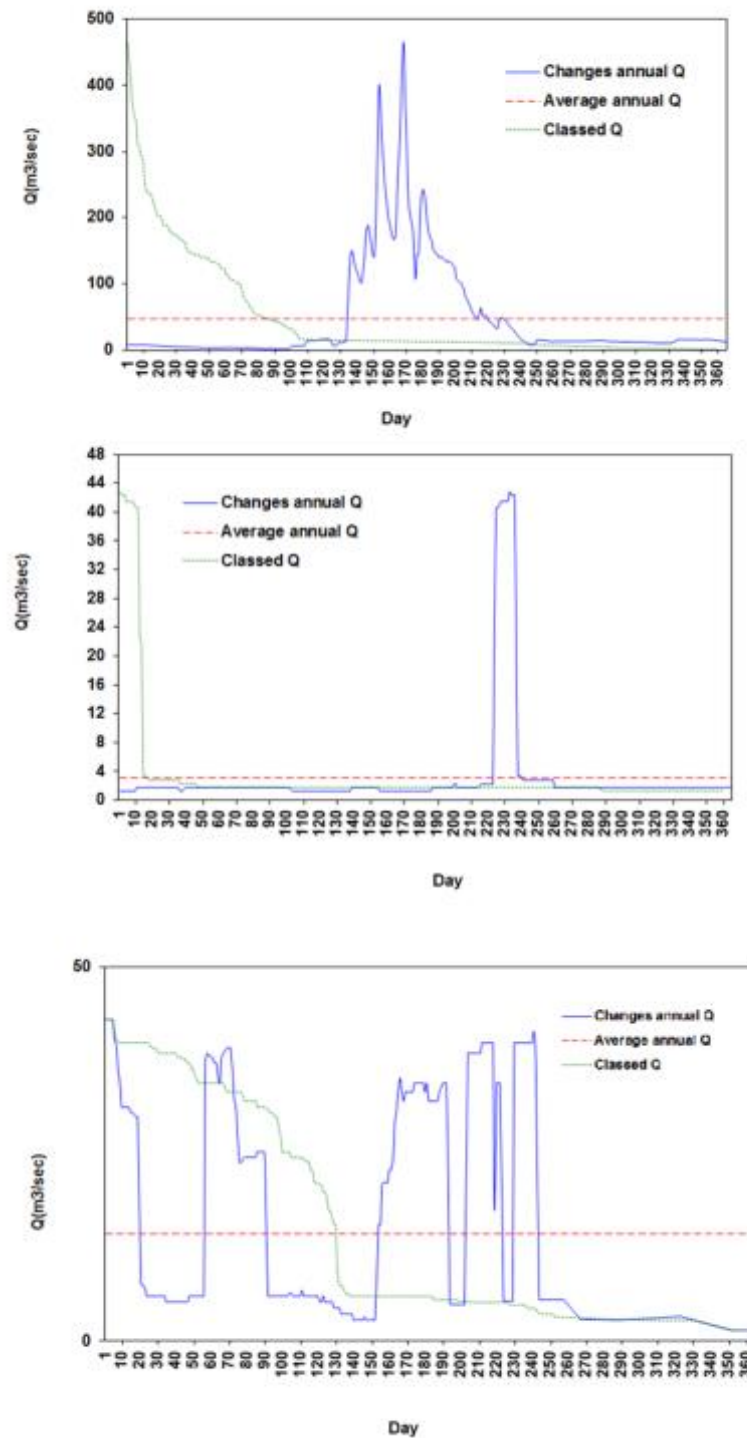


Figure 31: Changes in annual discharge and discharge classed curve at Drodzan dam station respectively for wet, dry and average years

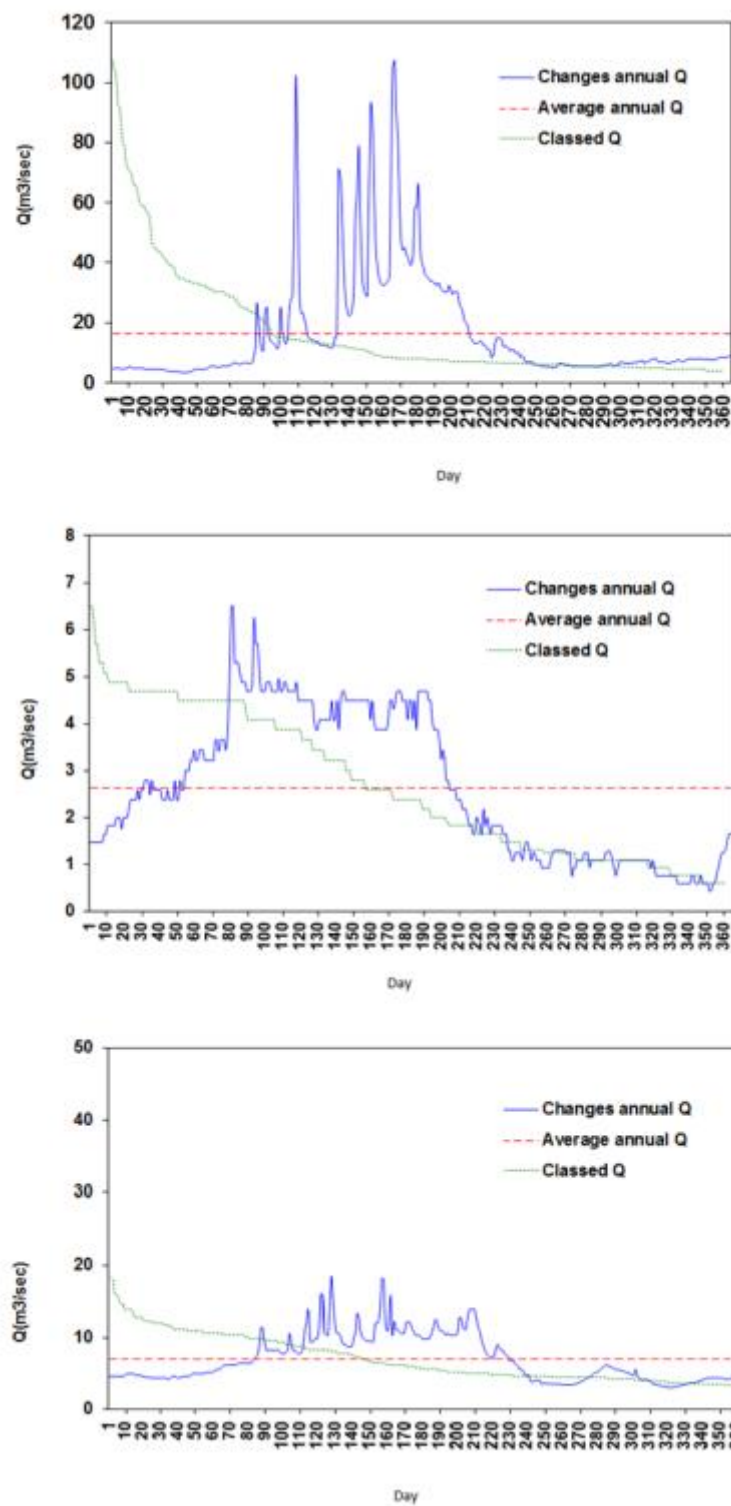


Figure 32: Changes in annual discharge and discharge classed curve at Gavgodar station respectively for wet, dry and average years

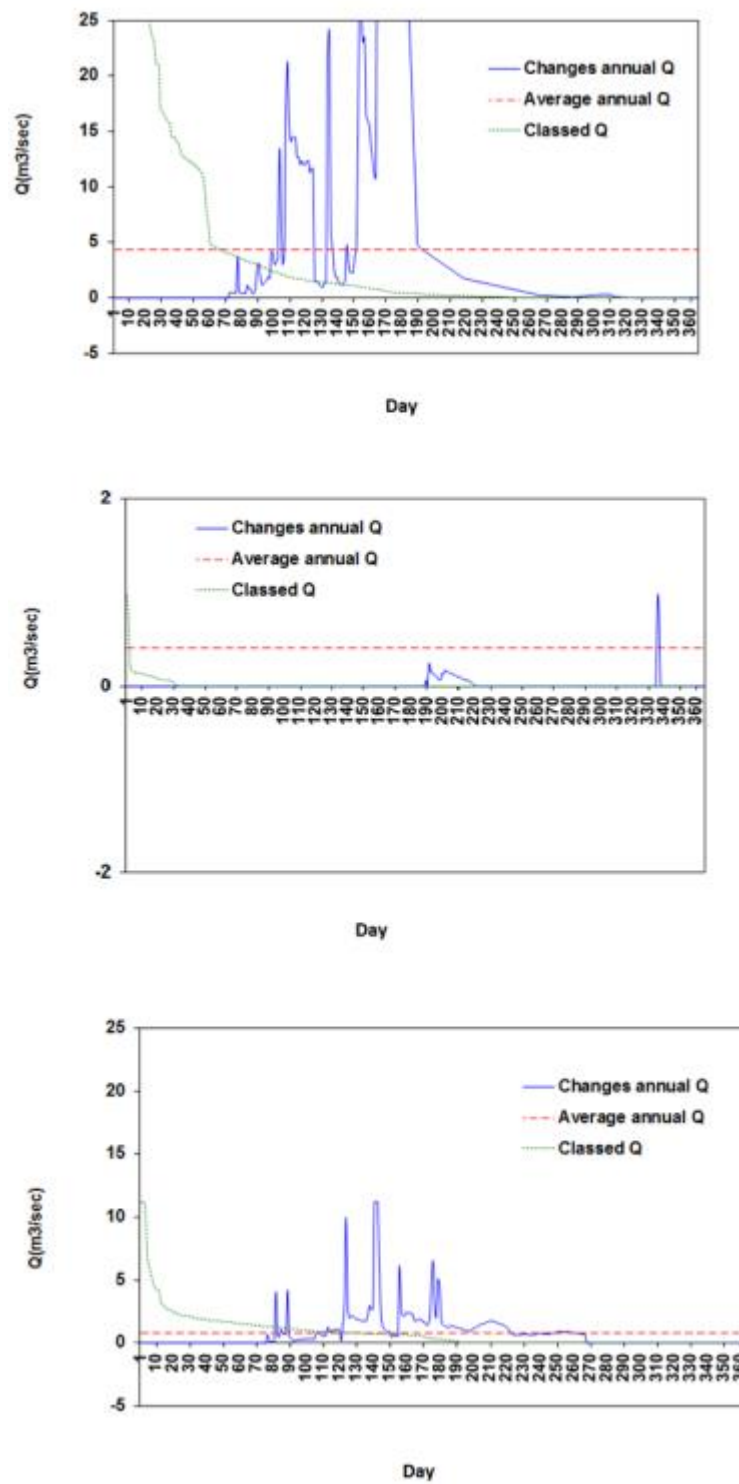


Figure 33: Changes in annual discharge and discharge classed curve at Chenarsokhte station respectively for wet, dry and average years

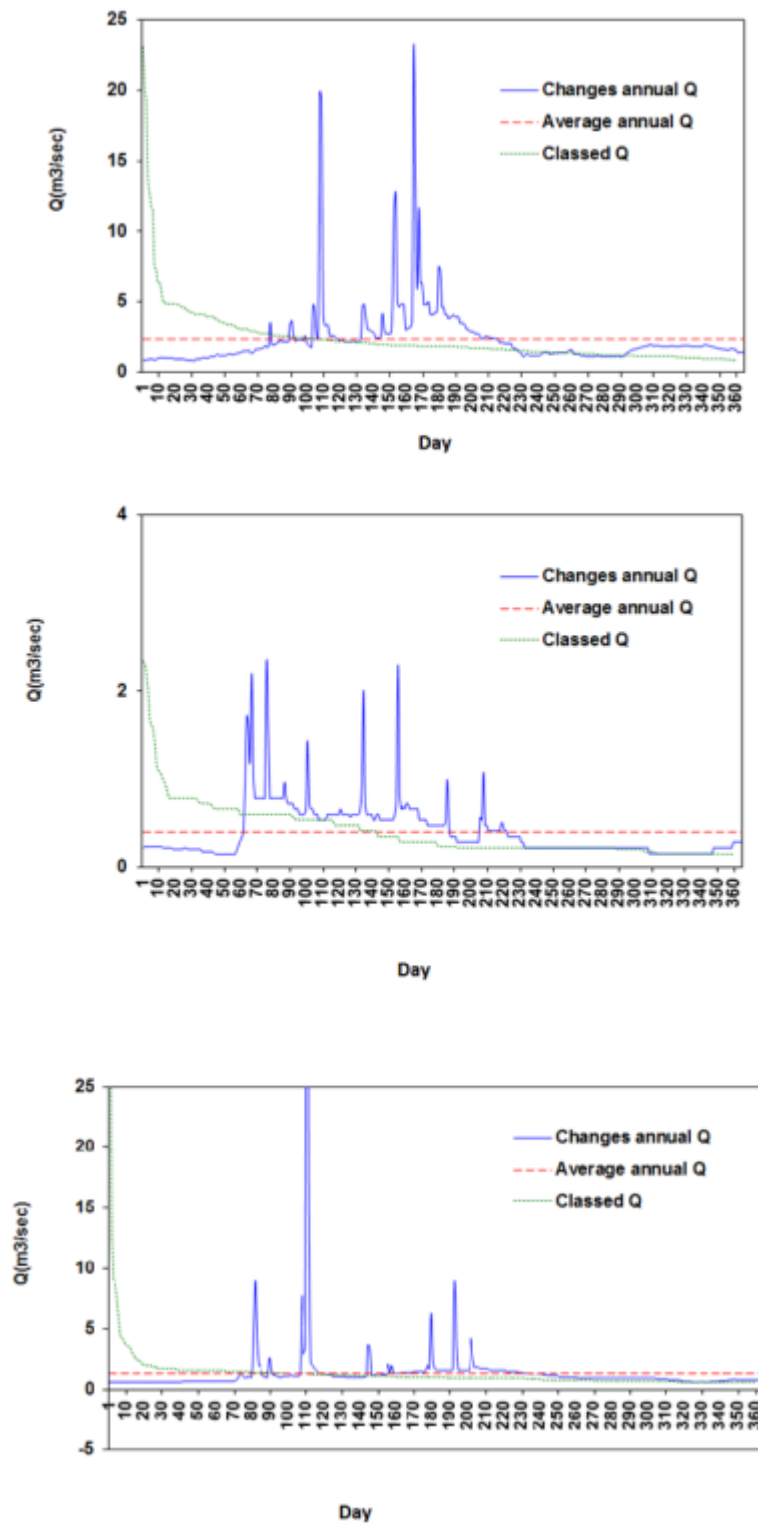


Figure 34: Changes in annual discharge and discharge classed curve at Nahrazam station respectively for wet, dry and average years

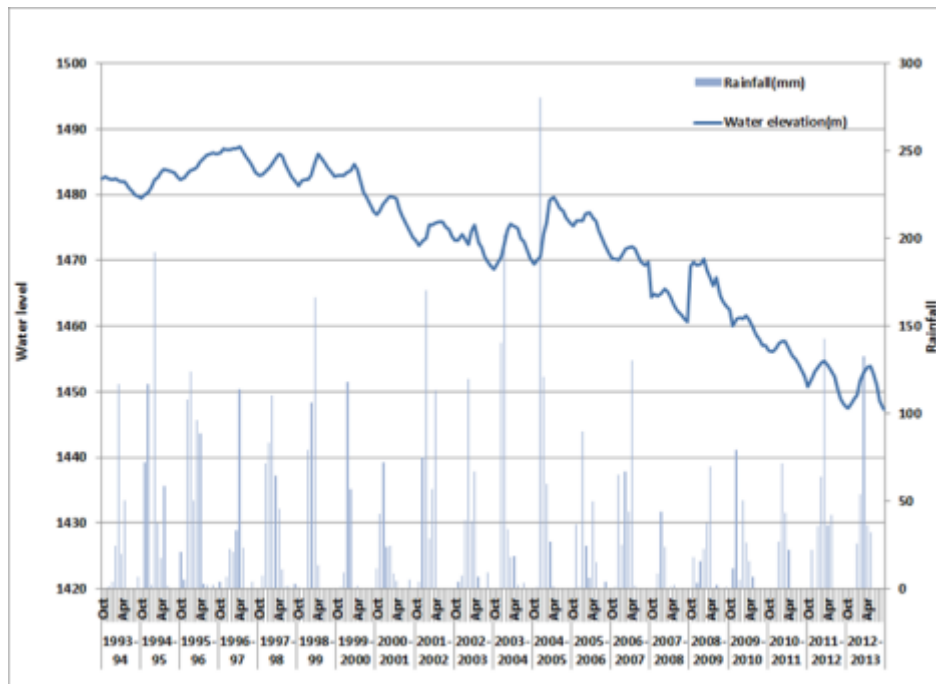


Figure 35: Tavabee Arsanjan Hydrograph

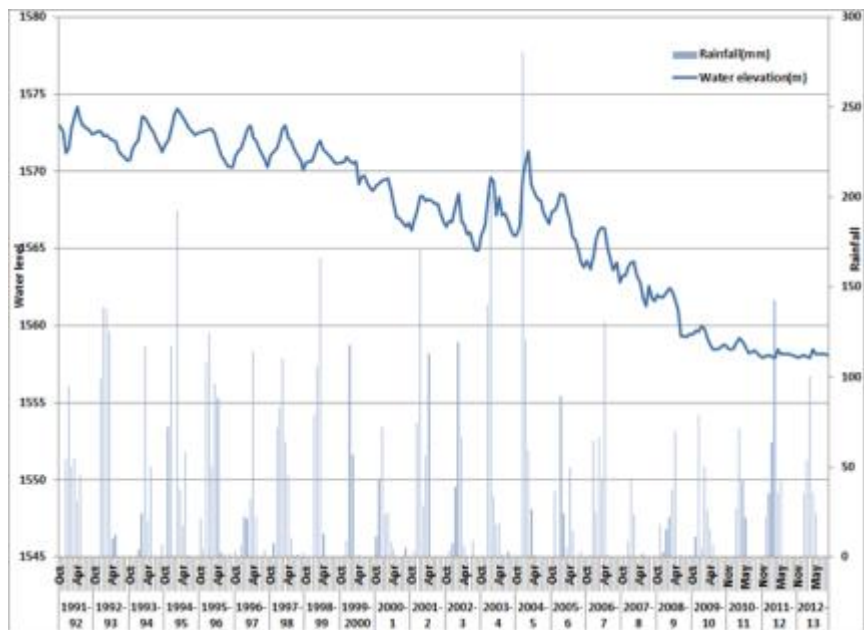


Figure 36: Arsanjan Hydrograph

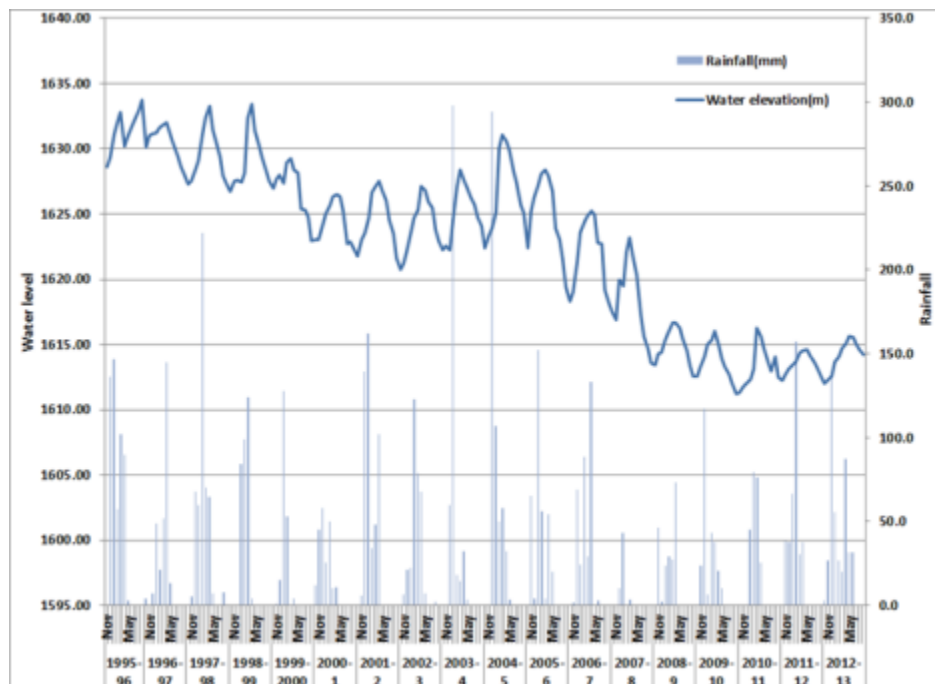


Figure 37: Seydan Farough Hydrograph

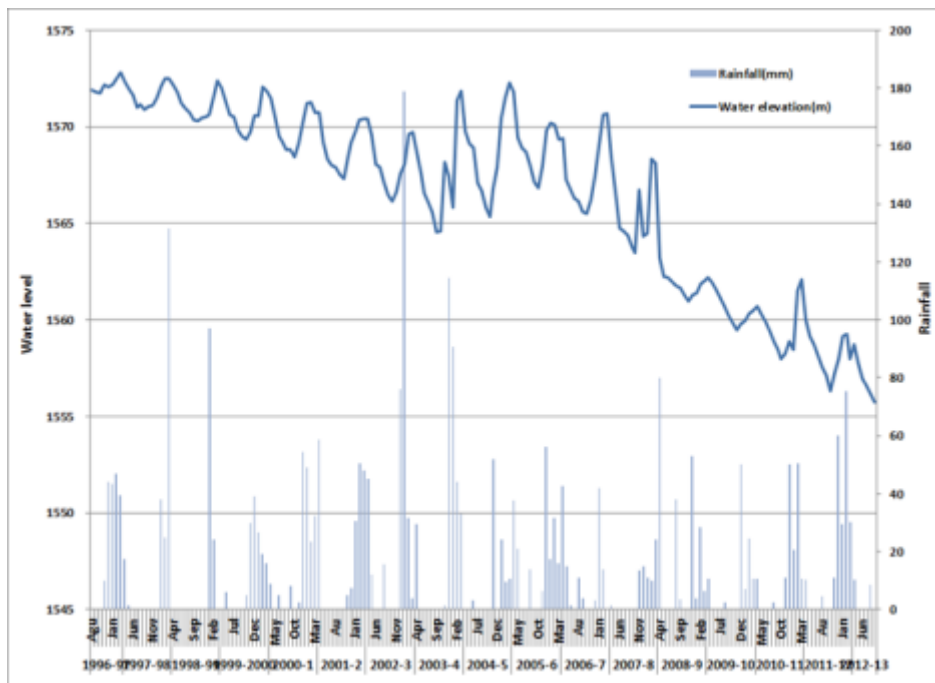


Figure 38: Khir Hydrograph

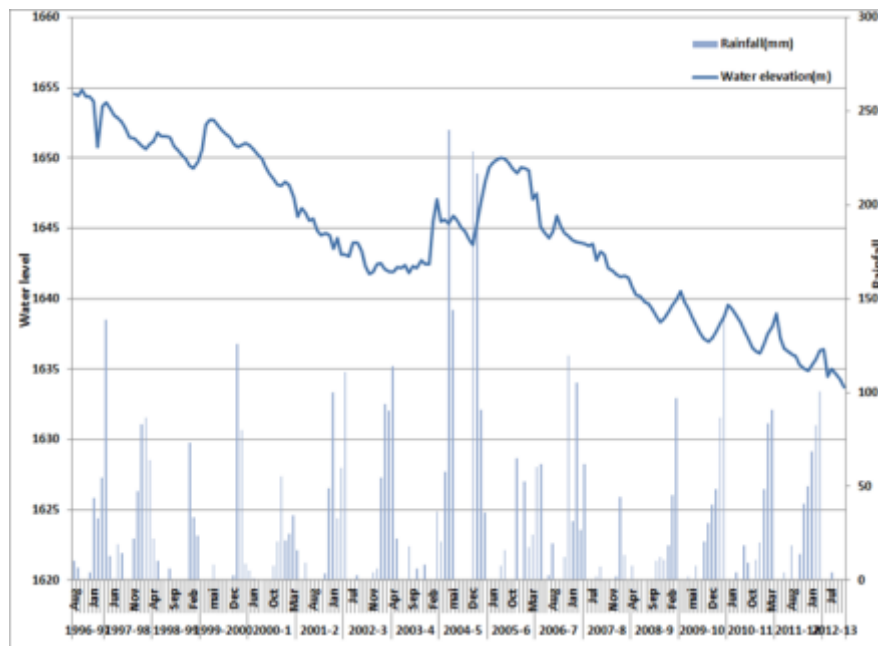


Figure 39: Estahban Hydrograph

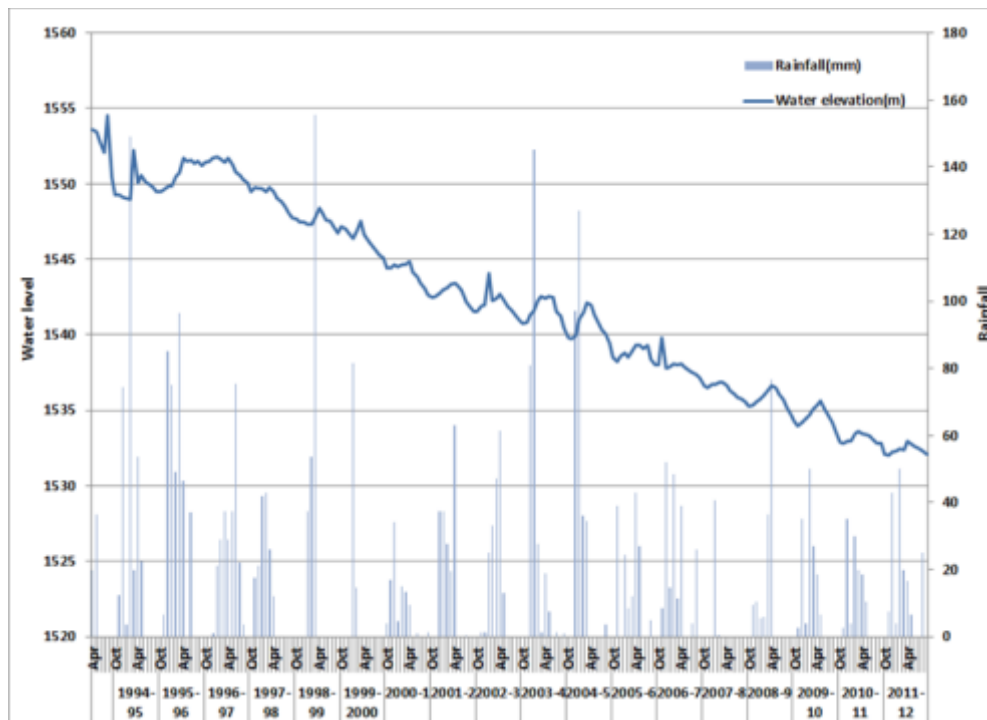


Figure 40: Neyriz Hydrograph

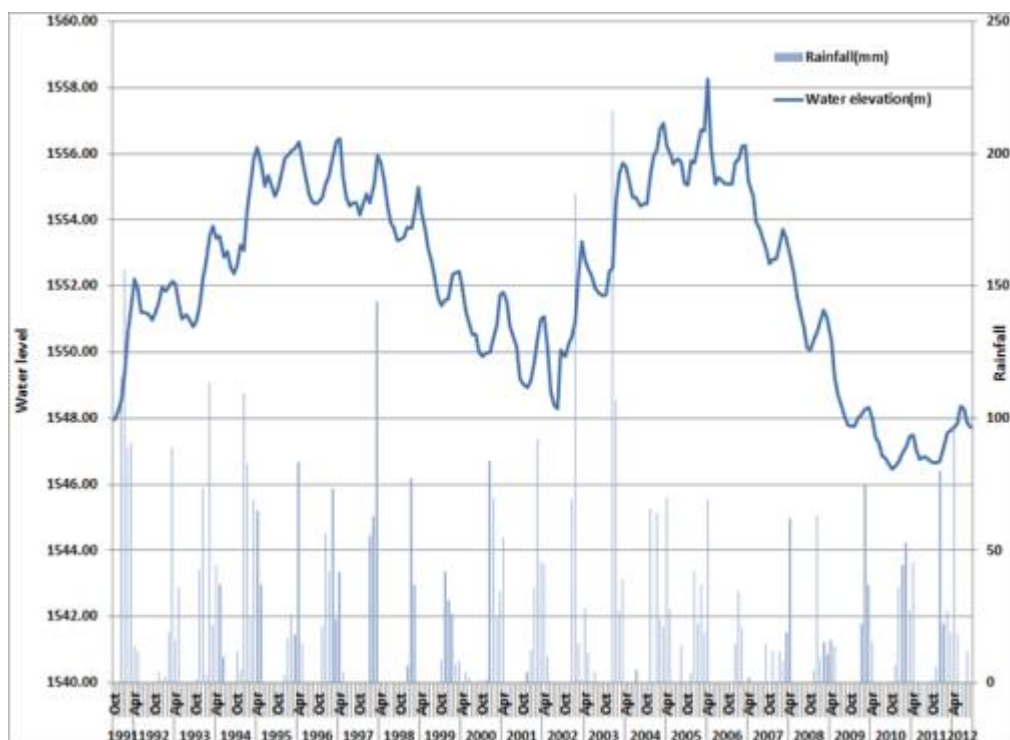


Figure 41: Kherameh Hydrograph

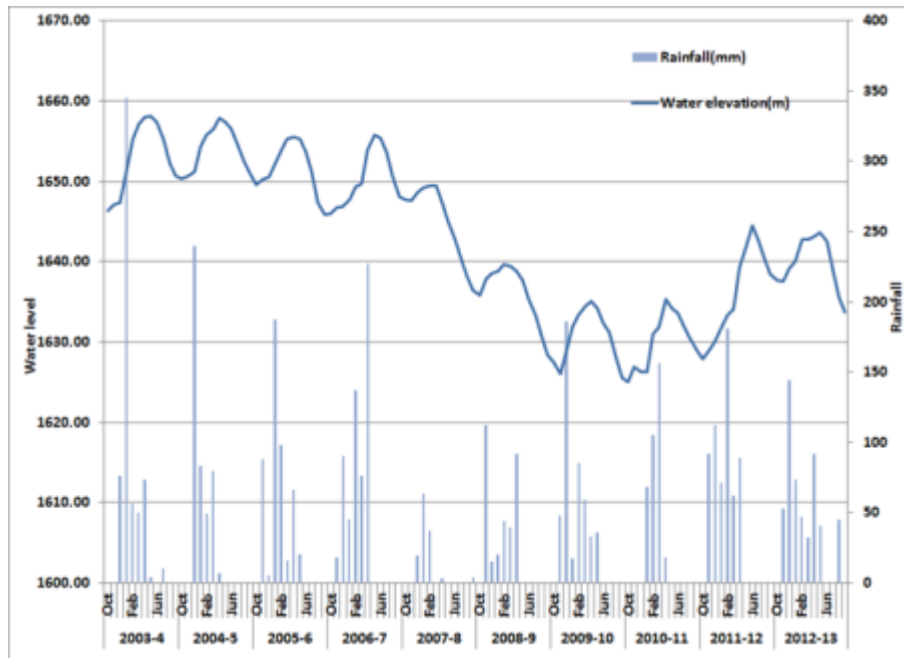


Figure 42: Dashtak-Drodzan Hydrograph

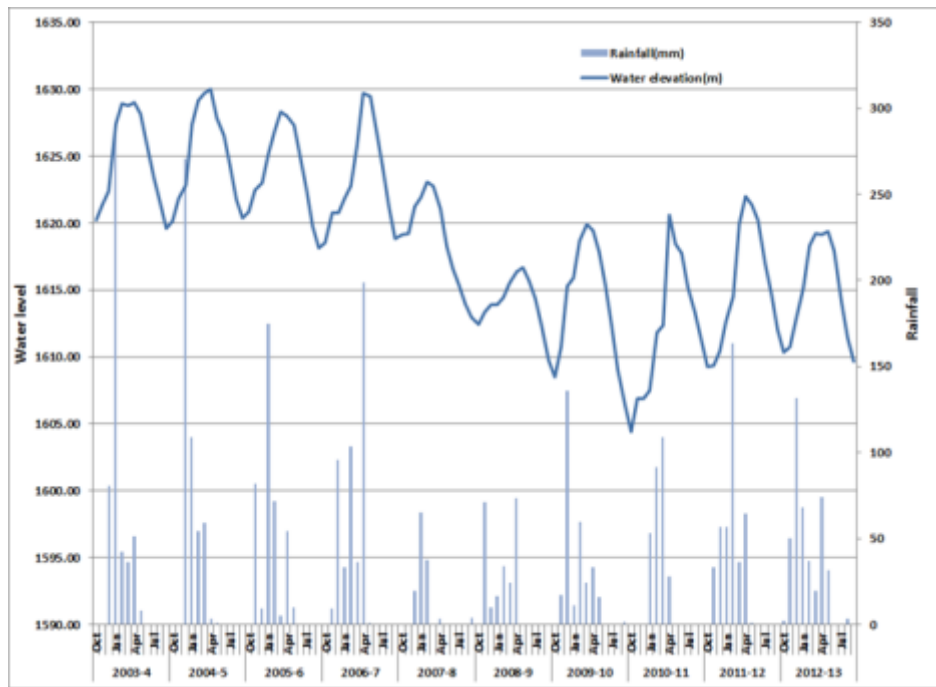


Figure 43: Maein-Bidkal Hydrograph

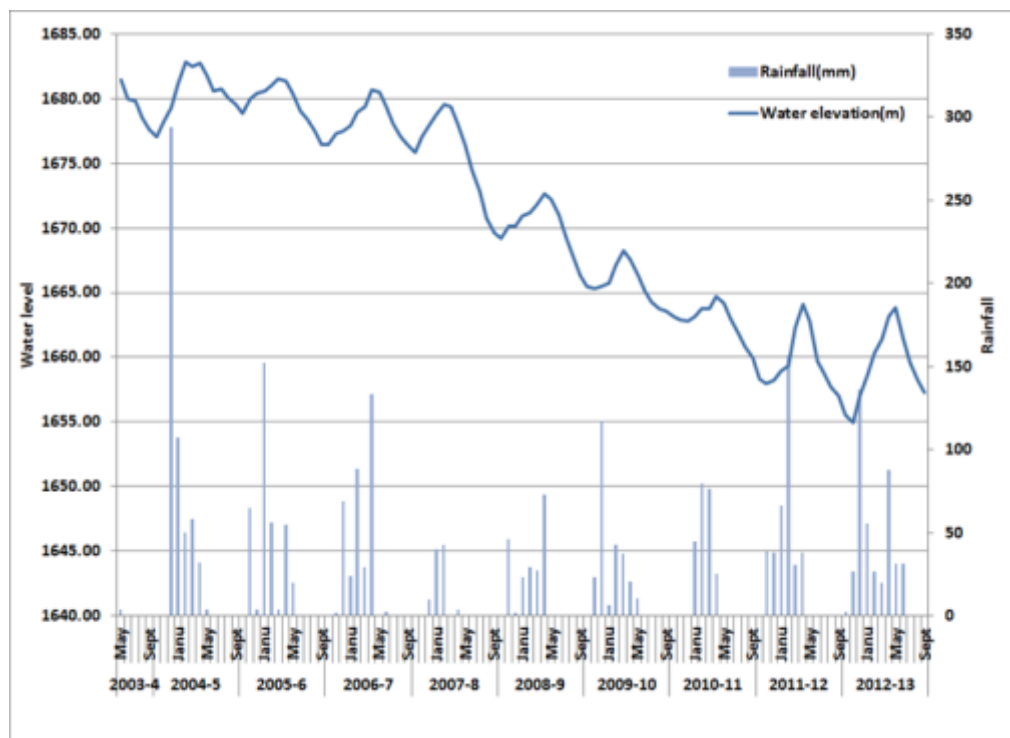


Figure 44: Dashtbal Lanetavos Hydrograph

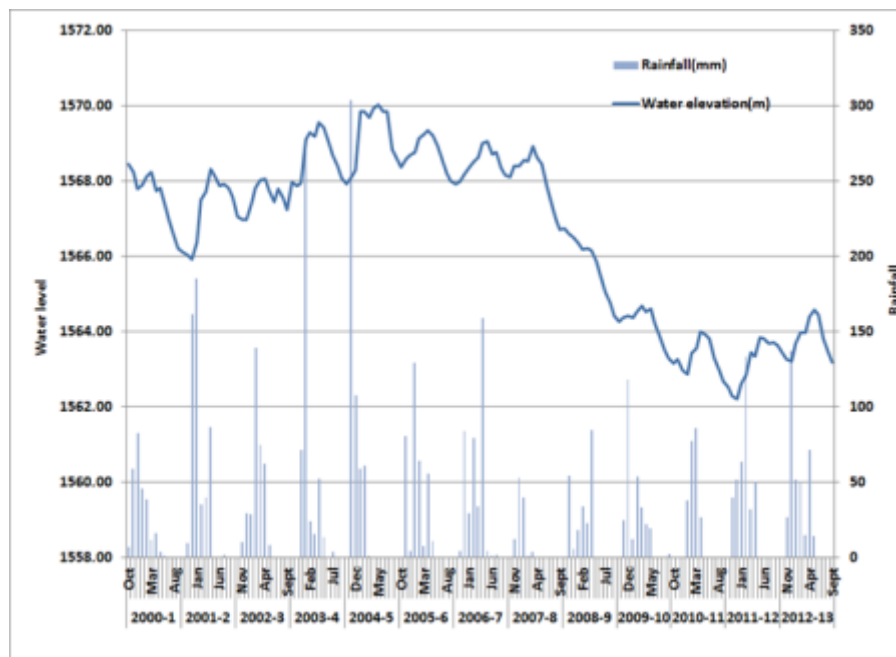


Figure 45: Marvdasht-Korbal Hydrograph

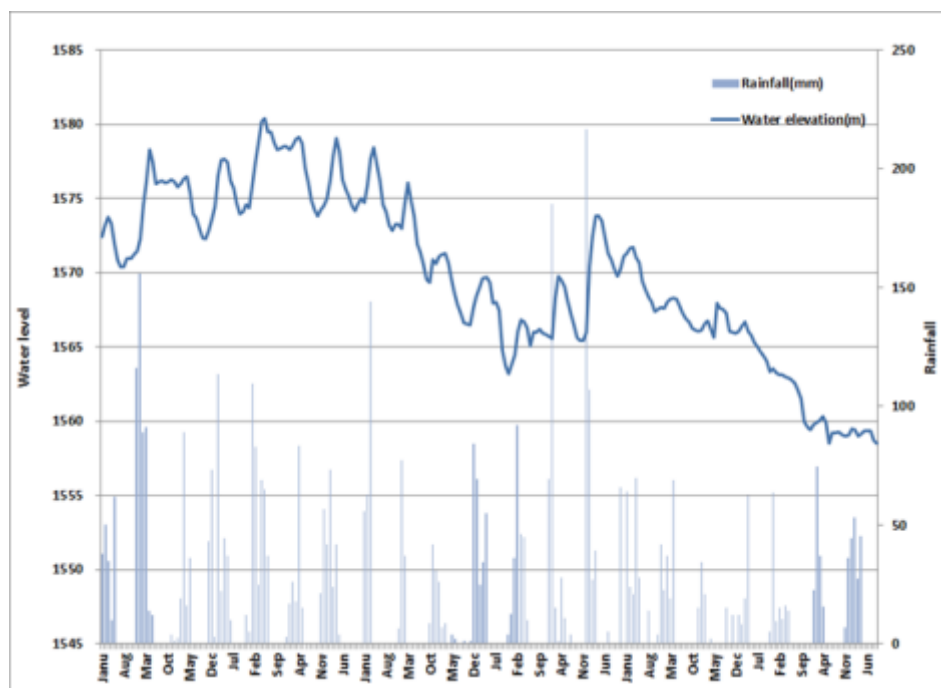


Figure 46: Darian Hydrograph

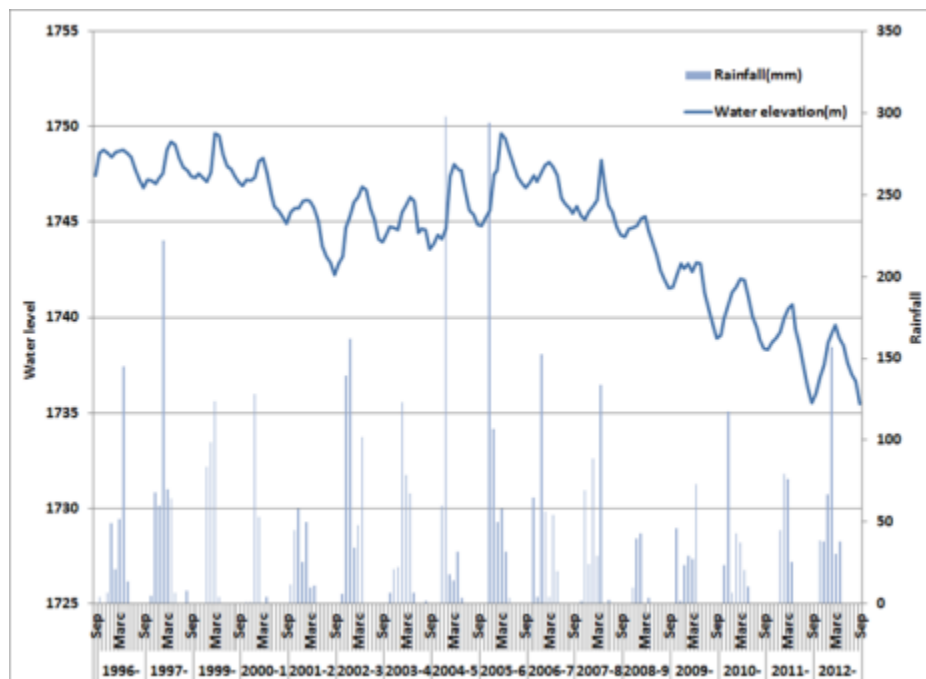


Figure 47: Saadatabad Hydrograph

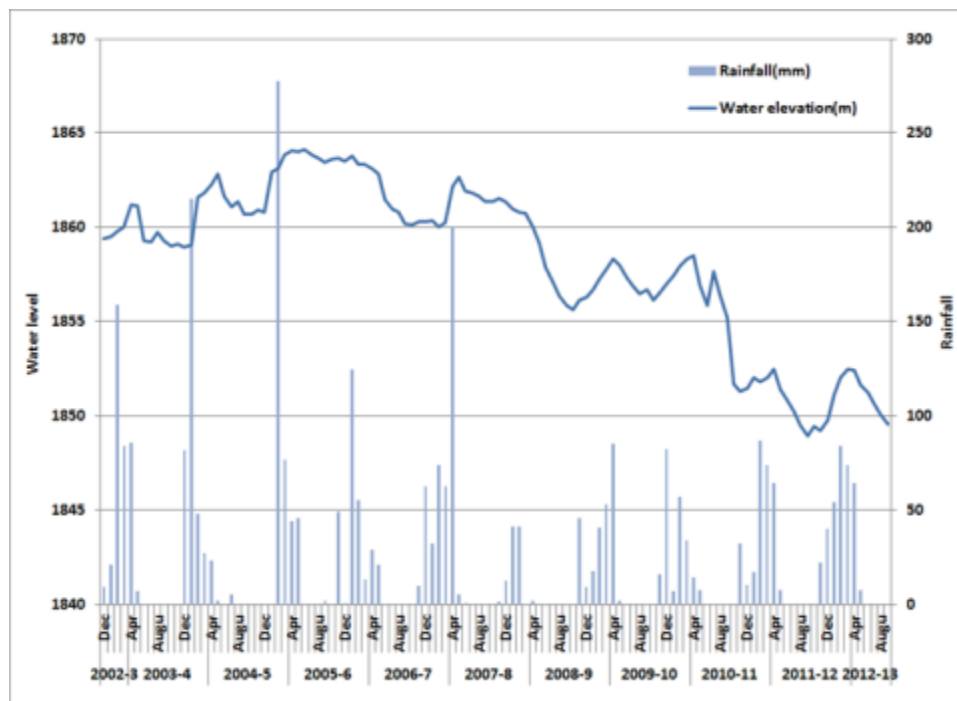


Figure 48: Ghaderabad Madarsoliman Hydrograph

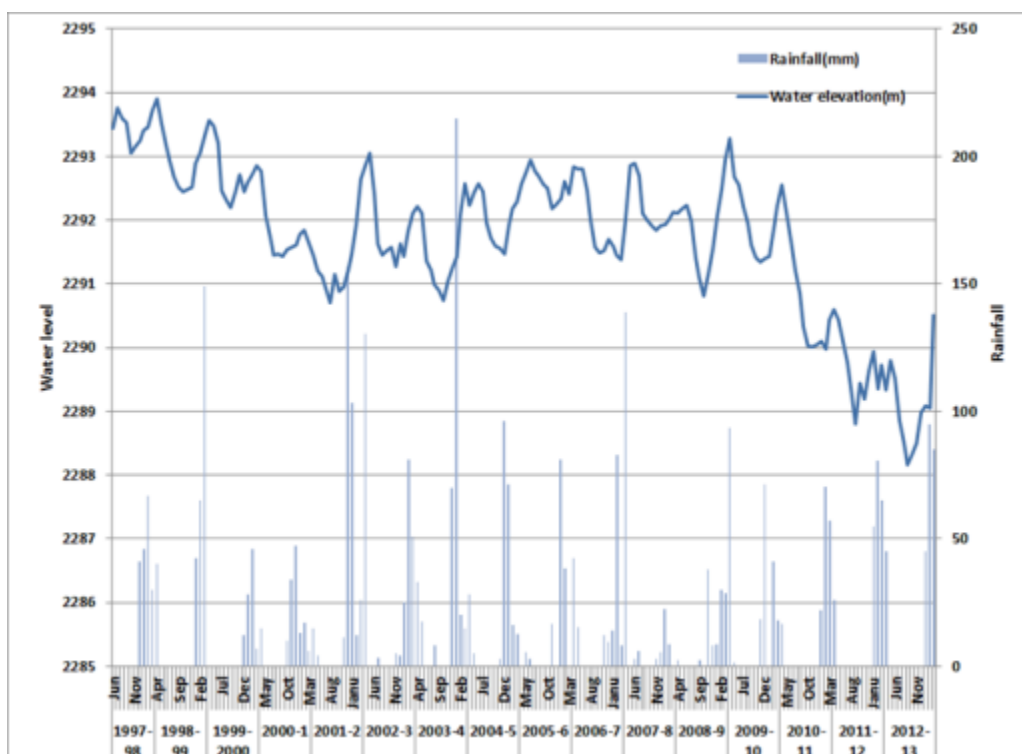


Figure 49: Dehbid Hydrograph

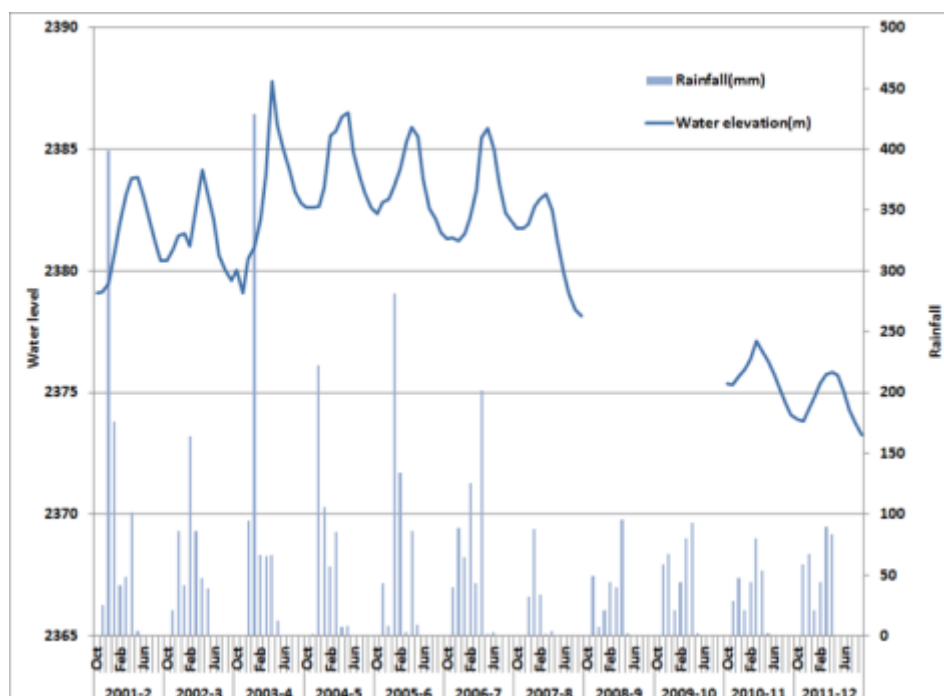
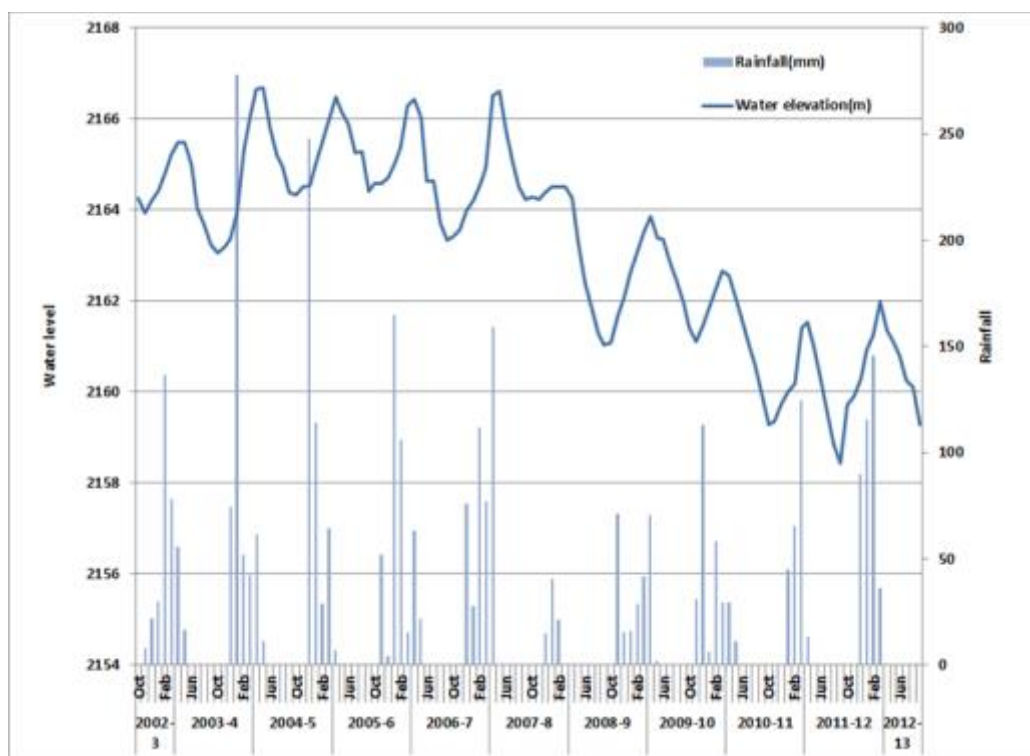
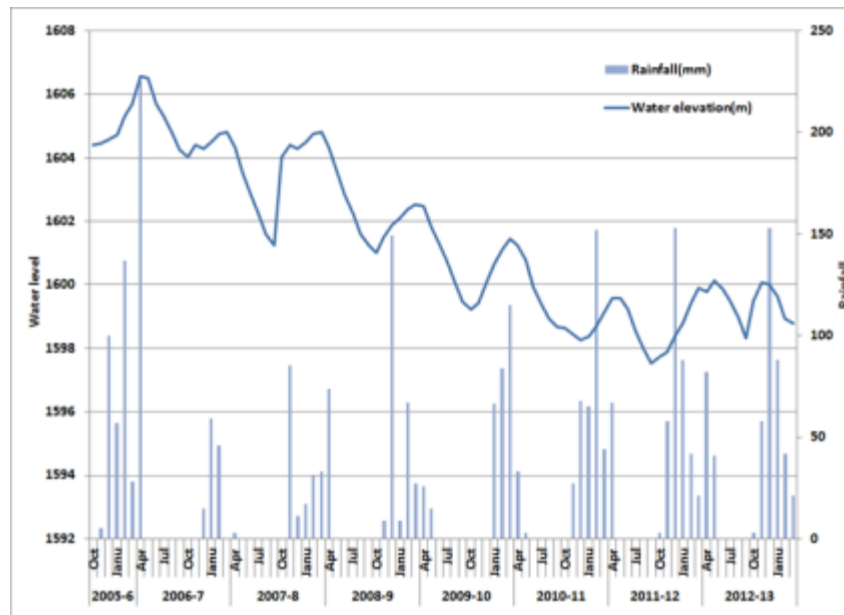


Figure 50: Namdan Hydrograph



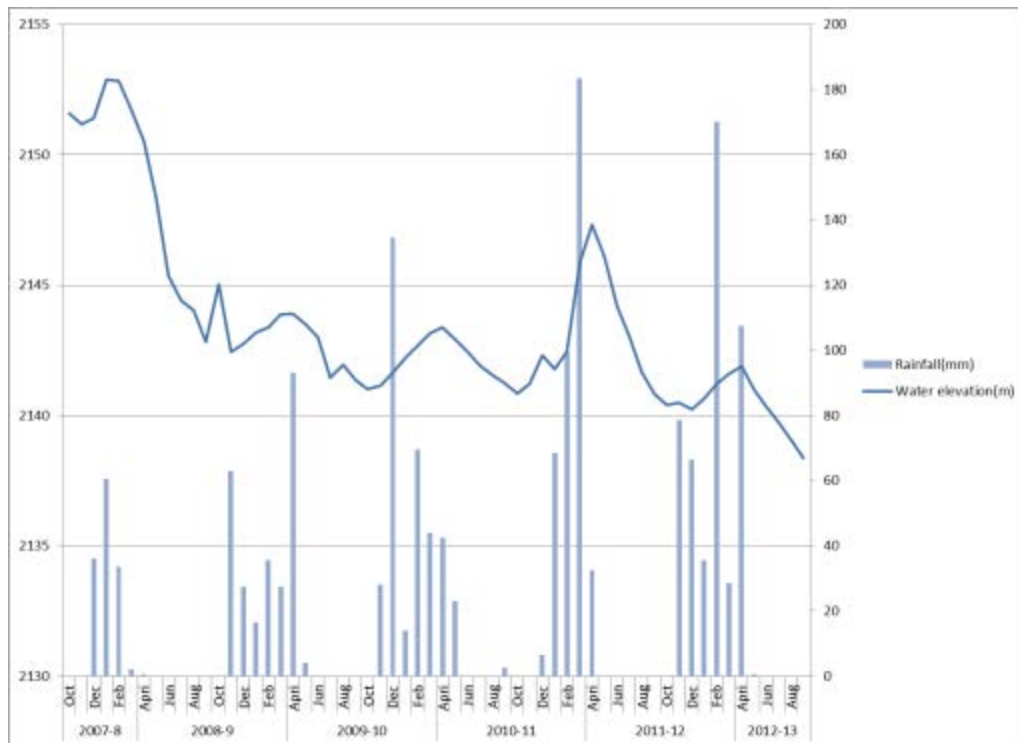


Figure 53: Bakan Hydrograph

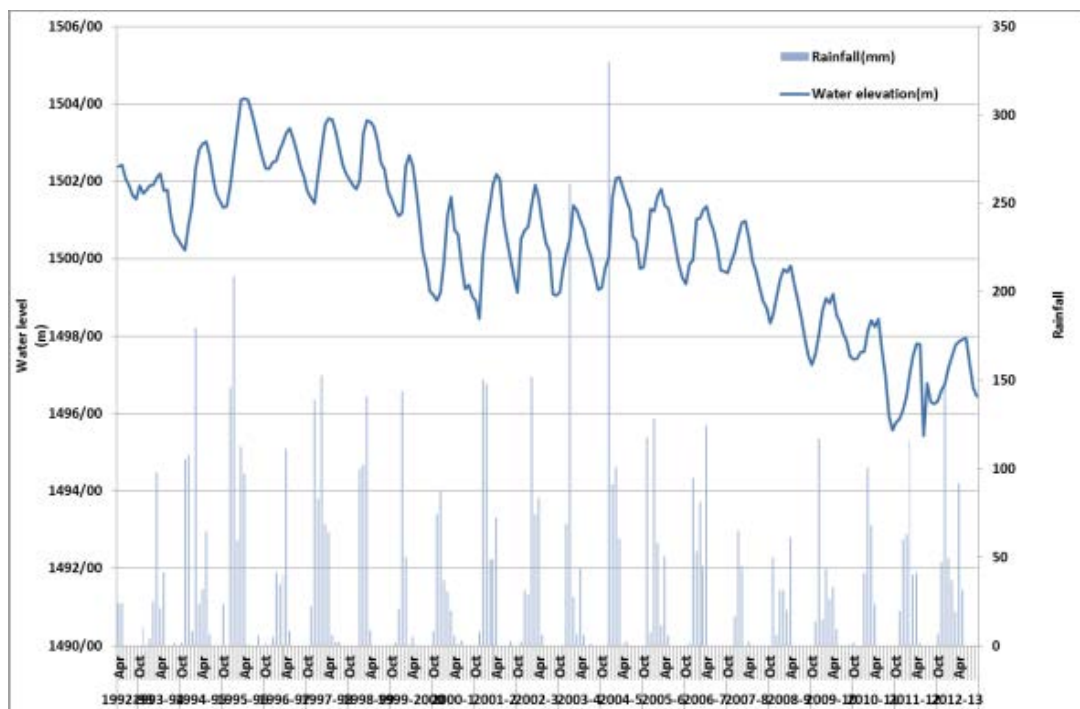


Figure 54: Shiraz Hydrograph

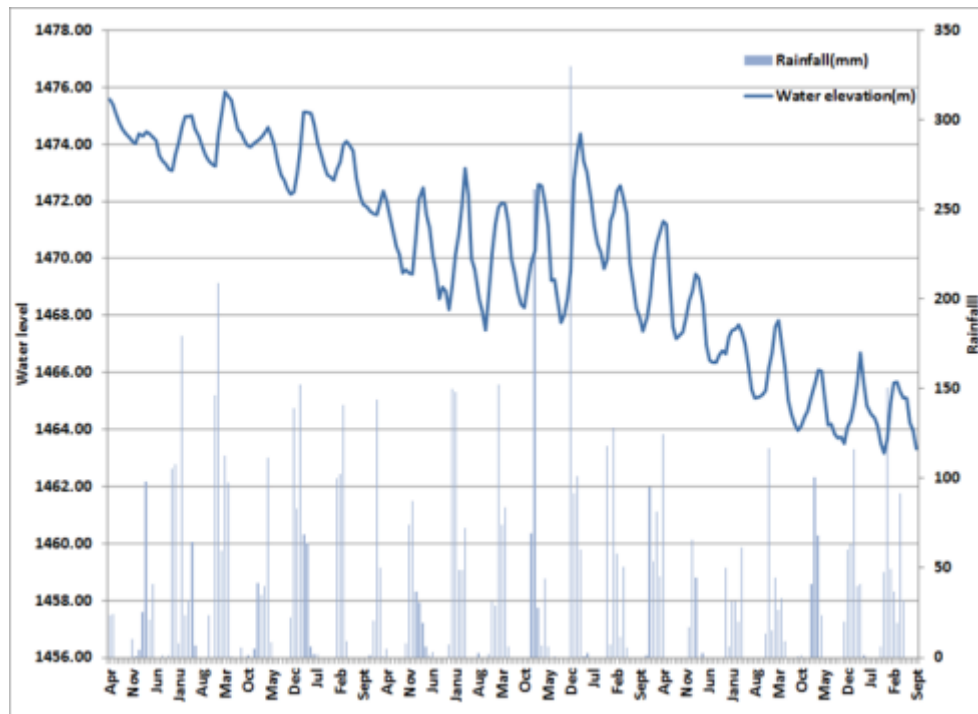


Figure 55: Gharebagh Hydrograph

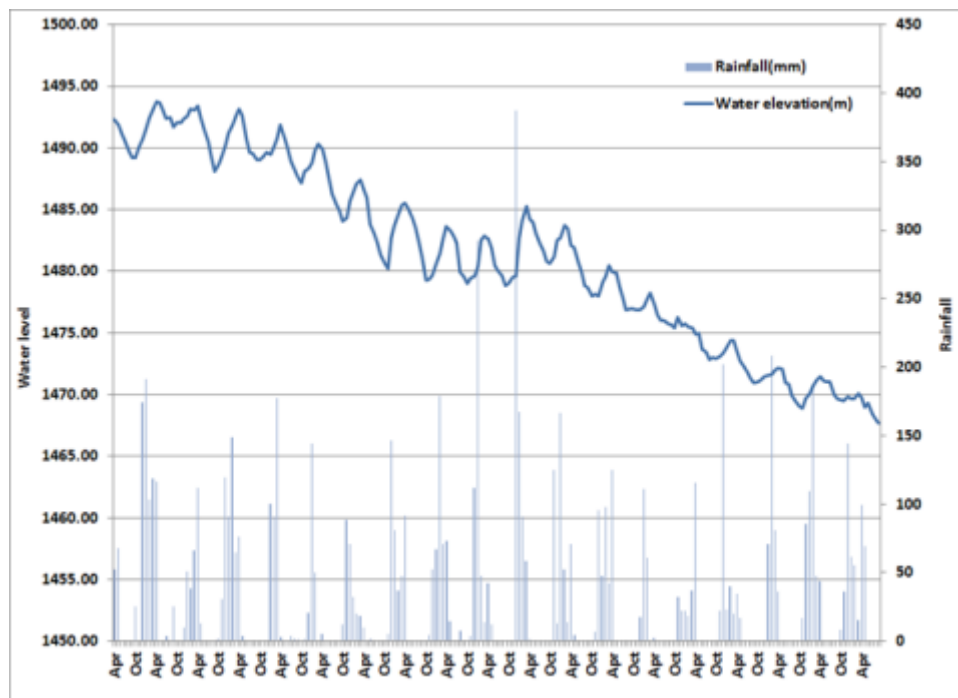


Figure 56: Kavar Maharlu Hydrograph

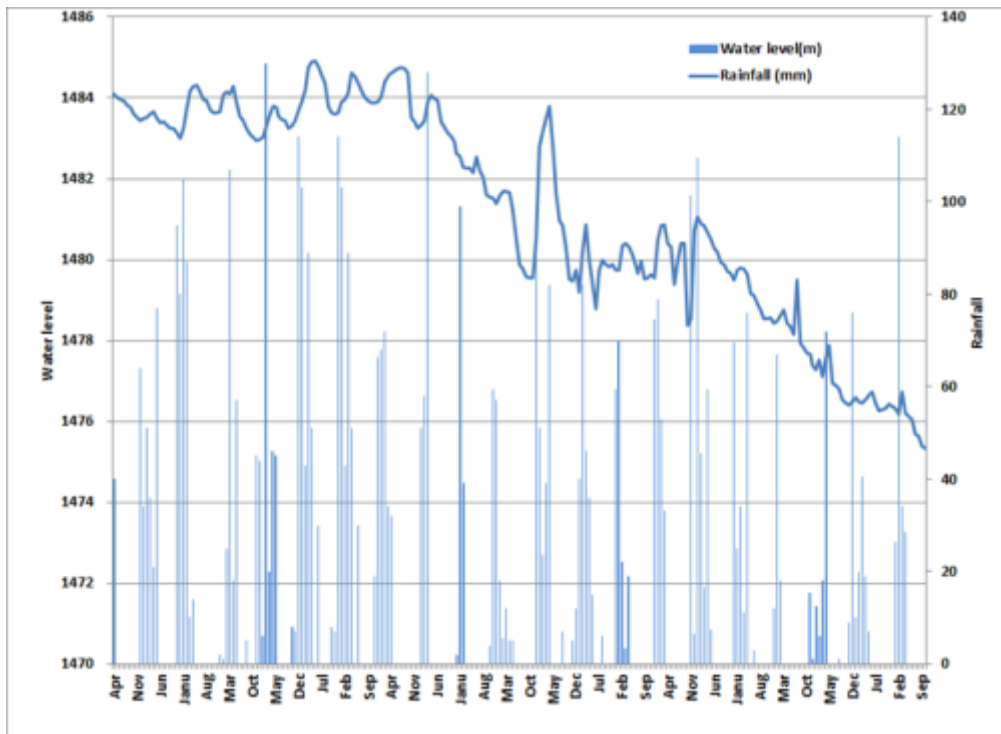


Figure 57: Sarvestan Maharlu Hydrograph